

FRITZ J. FRANK
President

J. H. VAN DEVENTER
Editor

C. E. WRIGHT J. A. ROWAN A. I. FINDLEY
Managing Editor *News Editor* *Editor Emeritus*

R. E. MILLER F. J. WINTERS T. W. LIPPETT
Machinery Editor *Art Editor* *Metallurgical Editor*

Associate Editors
F. J. OLIVER W. A. PHAIR G. RICCIARDI

Washington Editor
L. W. MOFFETT

Resident District Editors
T. C. CAMPBELL ROBERT G. BINGHAM
Pittsburgh *Chicago*
D. R. JAMES W. F. SHERMAN
Cleveland *Detroit*

Editorial Correspondents
F. B. RICE-OKLEY ROBERT G. MCINTOSH
London, England *Cincinnati*
G. FRAZAR P. FIDRMUC
Boston *Hamburg, Germany*
C. F. MEYER CHARLES POST
Milwaukee *San Francisco*
F. SANDERSON ASA ROUNTREE, JR.
Toronto, Ontario *Birmingham*
LEROY W. ALLISON ROY M. EDMONDS
Newark, N. J. *St. Louis*

F. T. TURNER, JR.
Buffalo



Owned and Published by



CHILTON COMPANY
(Incorporated)

Publication Office Editorial and
Executive Offices
Chestnut and 56th Sts., 239 West 39th St.
Philadelphia, Pa. New York, N. Y.

OFFICERS AND DIRECTORS

C. A. MUSSELMAN, *President*
FRITZ J. FRANK, *Executive Vice-President*
FREDERIC C. STEVENS, *Vice-President*
JOSEPH S. HILDRETH, *Vice-President*
GEORGE H. GRIFFITHS, *Vice-President*
EVERET B. TERHUNE, *Vice-President*
WILLIAM A. BARBER, *Treasurer*
JOHN BLAIR MOFFETT, *Secretary*
JOHN H. VAN DEVENTER, *Julian Chase*
THOMAS L. KANE, *Charles S. Baur*
G. CARROLL BUZBY, *P. M. Fahrenndorf*



C. S. BAUR, *General Advertising Manager*
A. H. DIX, *Manager Reader Service*



Member, Audit Bureau of Circulations
Member, Associated Business Papers
Indexed in the Industrial Arts Index.
Published every Thursday. Subscription
Price: United States and Pos-
sessions, Mexico, Cuba, \$6.00; Can-
ada, \$8.50; Foreign, \$12.00 a year.
Single copy, 25 cents. Cable Address,
"Ironage, N. Y."



ADVERTISING STAFF

Emerson Findley } 621 Union Bldg., Cleveland
Robert F. Blair }
B. L. Herman, Chilton Bldg., Phila.
H. K. Hottenstein, 1012 Otis Bldg., Chicago
H. E. Leonard, 239 W. 39th St., New York
Peirce Lewis, 7310 Woodward Ave., Detroit
C. H. Ober, 239 W. 39th St., New York
W. R. Robinson } 428 Park Bldg., Pitts.
W. J. Fitzgerald }
D. C. Warren, P. O. Box 81, Hartford, Conn.
Don F. Harner, 1595 Pacific Avenue, Long
Beach, Cal.

THE IRON AGE

Contents

OCTOBER 26, 1939

| | |
|---|-----|
| Birds Without Wings; Spiders Without Legs | 21 |
| Hot Galvanizing | 23 |
| Phosphorus in Steel | 28 |
| Polishing Technique for Stainless Steel | 32 |
| Use of Carboloy Tools | 36 |
| '40 Cars Replete with Die Castings | 39 |
| Job Lot Aircraft Stampings | 43 |
| On the Assembly Line | 48 |
| Washington News | 52 |
| THE NEWS IN BRIEF | 64 |
| Weekly Ingot Operating Rates | 71 |
| Rate of Activity in Capital Goods | 71 |
| Plant Expansion and Equipment Buying | 88 |
| ▼ ▼ ▼ | |
| New Industrial Literature | 14 |
| Products Advertised | 99 |
| Just Between Us Two | 101 |
| Index to Advertisers | 122 |

Copyright 1939 by Chilton Company (Inc.)

NEED STEEL?

Ryerson Has Thousands of Tons In Stock for Immediate Shipment

Especially now, when steel deliveries are somewhat uncertain, it is good to know that Ryerson has large and diversified stocks of certified steel on hand for quick shipment.

Thousands of manufacturers in every line are daily drawing on these stocks to meet current requirements. Ryerson immediate warehouse shipment forms cheap insurance for the protection of your production schedules.

Check up and play safe on your steel requirements. Ten large Ryerson plants, carrying more than 10,000 kinds, shapes, and sizes of steel and allied products, stand ready to meet both your regular and emergency needs — and you will get Ryerson certified quality at no extra cost. If you do not have the current Ryerson Stock List, we shall be glad to send a copy.

Joseph T. Ryerson & Son, Inc. Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, and Jersey City.



RYERSON

▲ ▲ ▲ THE IRON AGE ▲ ▲ ▲

OCTOBER 26, 1939

ESTABLISHED 1855

Vol. 144, No. 17

Birds Without Wings ;

Spiders Without Legs

IN these motorized days, mobility primarily depends on petroleum. The operation of a large number of motorized vehicles, machines or diesel engines driven by gasoline or oil calls for an adequate supply of fuel. Fuel is the limiting factor.

The United States has 68 per cent of the world's motor cars and produces within its borders 63 per cent of the world's crude oil production. Regardless of the American automobile makers' ability to make cars by the millions, we would not have them in these numbers if we did not have petroleum readily available. And conversely, if we did not have so many cars, our petroleum producing and refining facilities would not be so well developed as they are. Motorization and petroleum production travel together hand in hand.

It is well to keep this fact in mind in considering America's military defensive position. For modern warfare is a very highly motorized business which calls for tremendous quantities of motor fuel.

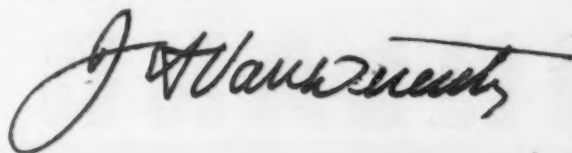
With our one automobile for every four persons, it would not require much civilian gas rationing to provide adequately for a motorized air and land force of any size that we could or would build. And that despite the fact that our flying and crawling engines of war are tremendous "gas eaters."

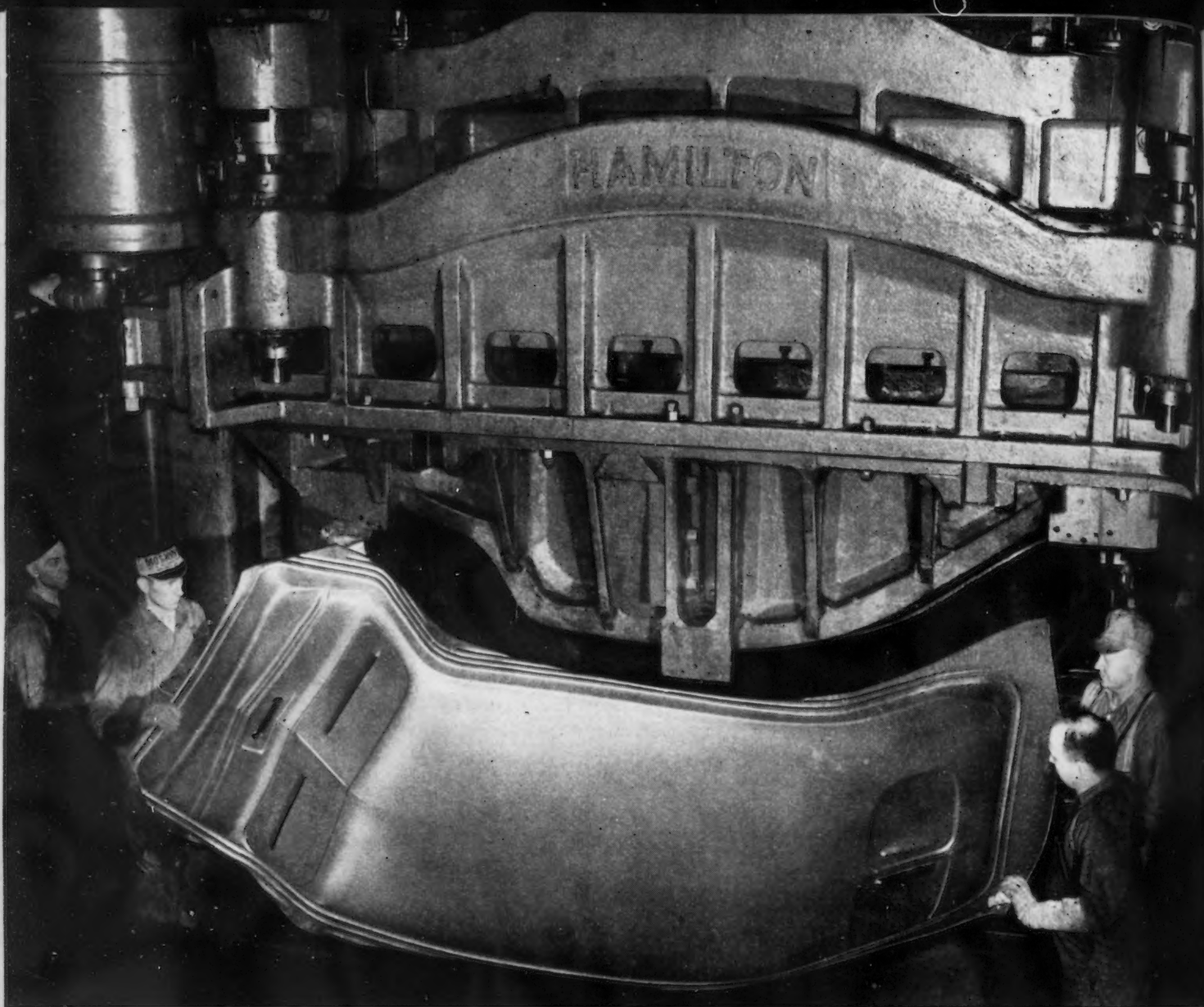
As compared with our 29,485,680 motor cars and trucks and its ratio of one to every four persons, Germany has 1,816,200 cars and trucks or one to every 42 persons. Russia has 672,952 or one such vehicle to each 252 of population. In Russia, most of these vehicles are in public service and are not privately owned.

Obviously there is comparatively little gasoline "cushion" to be had in these countries by restricting the use of private cars.

Germany has no petroleum resources but makes an "ersatz" gasoline from coal and potatoes. Her capacity has probably been stepped up since the war, but previously was given as 30,000 barrels a day. This compares with our United States gasoline production of about 1,500,000 barrels per day which of course is not our full capacity. Obviously Germany must import tremendous quantities of oil or gasoline to supply her heavily motorized military machine. Russia is her main dependence in this matter. But while Russia is rated at a crude oil production of about one-seventh of ours, she lacks refining capacity. That is why German engineers are hurrying to Russia. But even given refining capacity, there arises the problem of transportation. There are no pipe lines from Russia to Germany, nor anywhere near enough tank cars even if the Russian and German railroad gages were the same, which they are not for the great majority of lines.

But even if these difficulties are surmounted, Stalin will control Hitler's gasoline supply and through it Germany's mechanized birds and spiders.





INLAND Sheets

— custom-fitted to YOUR requirements

WHEN you buy steel, think of it in terms of your product—your particular forming operations—your manufacturing methods. What constitutes the right steel for someone else may not be at all the correct steel for your purpose.

At Inland we think of steel in the same way—an individual matter—a product made to fit your precise needs.

You see the result of that attitude in the character of Inland Cold Rolled Sheets. Their exact conformance to specifications, their superior finish, their dependable forming qualities are painstakingly built into them—from selection of raw materials, throughout each step of melting, heating, rolling, finishing. More and more steel users, as they learn of this principle of custom-fitted sheets, find profit and satisfaction in doing business with Inland.

INLAND STEEL CO.

38 S. Dearborn St., CHICAGO • District Offices: MILWAUKEE • DETROIT • ST. PAUL • ST. LOUIS • KANSAS CITY • CINCINNATI

SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS

Hot Galvanizing

BY A. T. BALDWIN

*Chemical Engineer, Hanson-Van
Winkle Munning Co.*

THE hot galvanizing process has always been under constant study to produce increasingly uniform, adherent coatings to give long and satisfactory service life. Great improvement in these coatings has come from a better understanding of the importance of careful preparation of the work prior to its being placed in the molten zinc. Fortunately, it has also been learned that the precautions which lead to improvement in quality also lead to lowered costs, largely through reduced wastes.

The necessity for removing iron oxide in any form from the work is well understood because the molten zinc will not attach itself securely to these oxides. Such cleaning is generally accomplished by pickling in an acid, most frequently sulphuric. Some products, notably castings, are regularly and satisfactorily being galvanized immediately after sand or shot blasting, without pickling.

Galvanizers are now aware that it is not sufficient to remove this iron as oxide by merely changing it to iron sulphate or iron chloride in pickles. Quality coatings at low cost require that iron sulphate or chloride be kept out of the zinc kettle. This precaution has led to greater care as well as the use of better methods and materials, in preparing the work for the zinc kettle.

Pickling

General pickling practice is to use sulphuric acid, usually from 5 to 10

HOW to produce uniform and adherent zinc coatings on steel, by careful and proper pre-treatment of the steel and correct usage of the flux wash and fused flux. The preparation and control of flux likewise are detailed.

per cent (by volume) in strength and to continue additions of new acid to the tank until the iron (Fe) content of the pickle reaches amounts exceeding 5 per cent. Then the pickle acid is thrown away and a new batch is prepared. Some pickling is done in cold acid but the major amount is done at 140 deg. F. or over. Iron sulphate, being more soluble in hot solutions than in cold, is generally allowed to accumulate in greater amounts in hot pickles.

There is a common belief that fresh sulphuric acid does not pickle as quickly or effectively as it does when it contains some iron sulphate. Often, therefore, part of an old pickle is retained and the new pickle is built from it. This point is debatable, but in the light of modern experience, it should not be favored. The important point is that the higher the iron sulphate content of the pickle, the more difficult it becomes to completely remove the drag-out from the work in the subsequent rinsing.

Best practice calls for the use of the

weakest sulphuric acid practical and discarding this pickle more frequently, thus avoiding high iron sulphate content and more difficult rinsing. Each plant must determine on its own work, just how weak the acid may be to accomplish thorough pickling within the required time, but a brief study of a plant's annual consumption of acid generally reveals the possibility of making changes in acid strength without affecting the cost or the pickling rate adversely.

Rinsing

Rinsing after pickling is the next step where high quality at low cost is greatly influenced by thoroughness. The best practice is to transfer the work from the hot sulphuric acid pickle to a cold, freely-running water rinse before the work dries, and it should be kept in the cold running water until it also is cold.

If the work dries in air after leaving the hot pickle it assumes first a greenish cast and eventually a brown color, as first a ferrous and finally a

ferric basic sulphate film forms. No amount of rinsing in water will remove these films and their formation must be avoided. This calls for maximum speed in transferring the work from the hot pickle to the water rinse.

Cold water, running freely, is the best rinse because the rinsed work also, when ready to be transferred to the flux wash, must not dry off, since it will acquire an oxide or hydrate type of rust which invariably follows drying at this stage.

Agitation of the work during rinsing is always helpful. Agitation in running cold water has proved to be a most effective way to secure the removal of any pickle acid or iron salts of this acid from the work to be galvanized. The older the pickle acid and the higher its content of iron salt, the more necessary it is to use running cold water and work agitation. The cold water should flow freely enough so that the rinse water film left on the work contains a minimum of iron salts. The object of rinsing is to remove the pickle solution from the work, not merely to dilute it. Avoid rinsing in still water which, in reality, may be merely a dilute pickle.

The reward for this care in rinsing is a greatly lowered dross production and smoother, more ductile and adherent coatings. (Table I) shows data illustrating the lessened dross formation resulting from effective rinsing accompanied by the use of a zinc ammonium chloride flux wash and kettle flux. These data are current operating figures for malleable iron pipe fittings in a plant which galvanizes approximately 20,000 lb. of fittings in 8 hr. They reflect mostly what careful rinsing will do, although the use of a better type of zinc ammonium chloride flux and flux wash was involved in the change from the old operating practice to the one used when the new process data were being accumulated. The dross figure of 9.8 per cent of weight of fittings galvanized (186 lb. per ton of fittings) while high, is not exceptional with a product where the more common figures vary between 130 lb. and 200 lb. per ton of fittings galvanized. All castings in this plant are acid pickled prior to rinsing and fluxing.

By "yield" is meant the pounds of castings galvanized per pound of zinc used. At the higher yields the castings had a $2\frac{1}{2}$ oz. per sq. ft. average coating and showed over four immersions on the Preece test. The actual surface area of the fittings galvanized during each period has an important influence on the dross produced and explains

the variations between the three new process tests.

The Flux Wash

The older practice of using hydrochloric acid as a flux wash probably grew out of the necessity for correcting the weakness of the casual and inadequate rinsing performed in many shops. Something had to be done with the films of basic sulphates or hydrated oxides that appeared on the work. Converting them to chlorides seemed to be the answer because continuous zinc coatings of fair adherence were obtained. Such hydrochloric acid fluxed work could be dried before dipping to assure safe handling. It appealed, therefore, largely because it was the easy way to do things, although

the dross production was high and the coatings peeled easily at the most unexpected and inconvenient times.

By this method the work to be galvanized is coated with a film of iron chloride. When it is placed in the molten zinc this film must be removed before the zinc will coat the iron (that is, alloy with the iron). Removing the iron chloride film in the flux fusion on the molten zinc provides iron to form dross. Likewise, the more iron chloride there is to be removed, the thicker and more brittle is the final zinc coating.

The answer to these objections to a hydrochloric acid flux wash is to substitute for it a water solution of zinc ammonium chloride. The zinc ammonium chloride flux wash places a



FIG. 1—A striking example of the value of proper preparation prior to hot galvanizing. (Left) Bolt galvanized after muriatic acid fluxing. (Right) Bolt galvanized after thorough rinsing and the use of a zinc ammonium chloride flux wash.

protecting film over the properly rinsed surfaces and thus delivers them, clean, to the molten zinc. The result is a material drop in dross formation and a decided improvement in zinc coating adherence and ductility. Fig. 1 illustrates this improved adherence which follows replacing the muriatic acid flux system with a zinc ammonium chloride system.

The zinc ammonium chloride flux wash can be varied in concentration to suit the type of work being done. It is preferable to use a wooden tank, and to heat it, using either a lead or Monel metal steam coil. Heating speeds up the operation, causing the evaporation of excess moisture from the flux film, also providing greater safety in handling. Pre-heating the work also reduces the operating time of galvanizing. It drives out absorbed hydrogen taken on by the work in pickling, which further improves the smoothness and adherence of the coating. The zinc ammonium chloride flux wash places a film of new, flux-producing material over all work surfaces, which assures proper kettle fluxing, especially on inner surfaces.

The Flux Fusion

Sal ammoniac (ammonium chloride) has long been the preferred material to produce the fused flux on the molten zinc. The objections to it were the heavy fumes, its short life and the loss of spelter with which it combined to produce the stable fusion on the kettle. It was realized that the actual fusion produced by sal ammoniac was in reality zinc ammonium chloride, so

| Galvanizing Method | Days Work | Per Cent Dross to Spelter in Pot | Per Cent Dross to Weight of Zinc in Pot | Per Cent Dross to Lb. Production | Yield, Lb. |
|--------------------|--------------|----------------------------------|---|----------------------------------|------------|
| Old | Long average | 70.0 | 11.5 | 9.8 | 7.0 |
| New | 8 1/2 days | 42.4 | 9.2 | 4.4 | 9.7 |
| New | 12 1/2 days | 31.9 | 7.4 | 2.3 | 13.6 |
| New | 8 days | 30.6 | 7.1 | 3.0 | 10.8 |

it seemed logical to start with this compound itself, rather than to produce it at high cost from sal ammoniac and the zinc in the kettle.

Sal ammoniac breaks down, that is gives off fumes, at about 345 deg. F. Zinc ammonium chloride does not fume until it reaches about 650 deg. F., so its use leads to reduced fume trouble. This characteristic has led some to say it is a slower flux. In practice, however, when it is used as a flux wash and also to produce the fused flux on the kettle, the result overall is actually faster zinc coating on the work.

The most effective zinc ammonium chloride flux contains about 22 per cent zinc, and a major part of the zinc in the flux skimmings comes from this source and not from the spelter. Experience also shows that it requires from 10 to 20 per cent less of zinc ammonium chloride than sal ammoniac to do the same work as a flux.

Some Practical Results

This discussion might be summarized by saying that high quality gal-

vanizing at low cost follows partly from careful pickling and complete rinsing to secure clean work, which is kept in this preferred condition by the use of a zinc ammonium chloride flux wash and kettle flux.

Attention to these points leads to a reduction of the iron introduced into the kettle and permits better control of the iron in solution in the molten zinc. The alloying of the zinc to the basis metal is more rapid, thus reducing the time the work needs to remain in the kettle, which also means less iron taken into solution in the molten zinc, as well as thinner layers of the brittle zinc-iron alloys.

The production of smooth, adherent, ductile zinc coats is accomplished mostly by attention to these points. What otherwise would lead to the production of an acceptably adherent coating can be spoiled by neglecting attention to the immersion time in the molten zinc. Micrographs on commercial hot galvanized pipe will show an increase in alloy layer thickness with time and after, say, three minutes there will be discernible an erosion of the basis metal by the hot zinc; also.

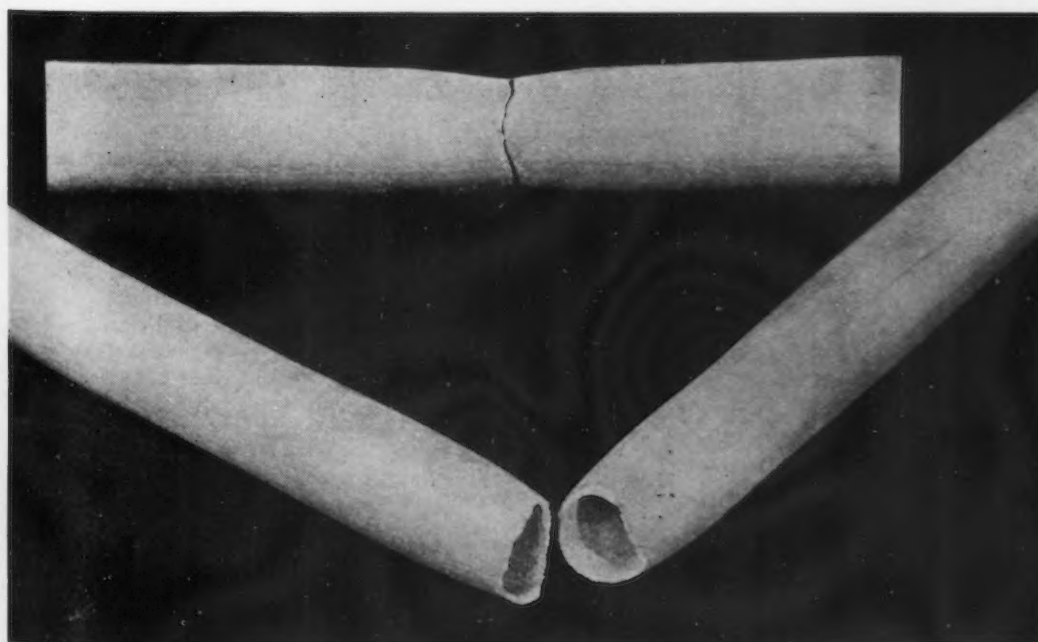


FIG. 2 — (Above) Tensile test for adherence of zinc on 1-in. pipe. (Below) Same 1-in. galvanized pipe, showing adherence of zinc coating after rupture of pipe.

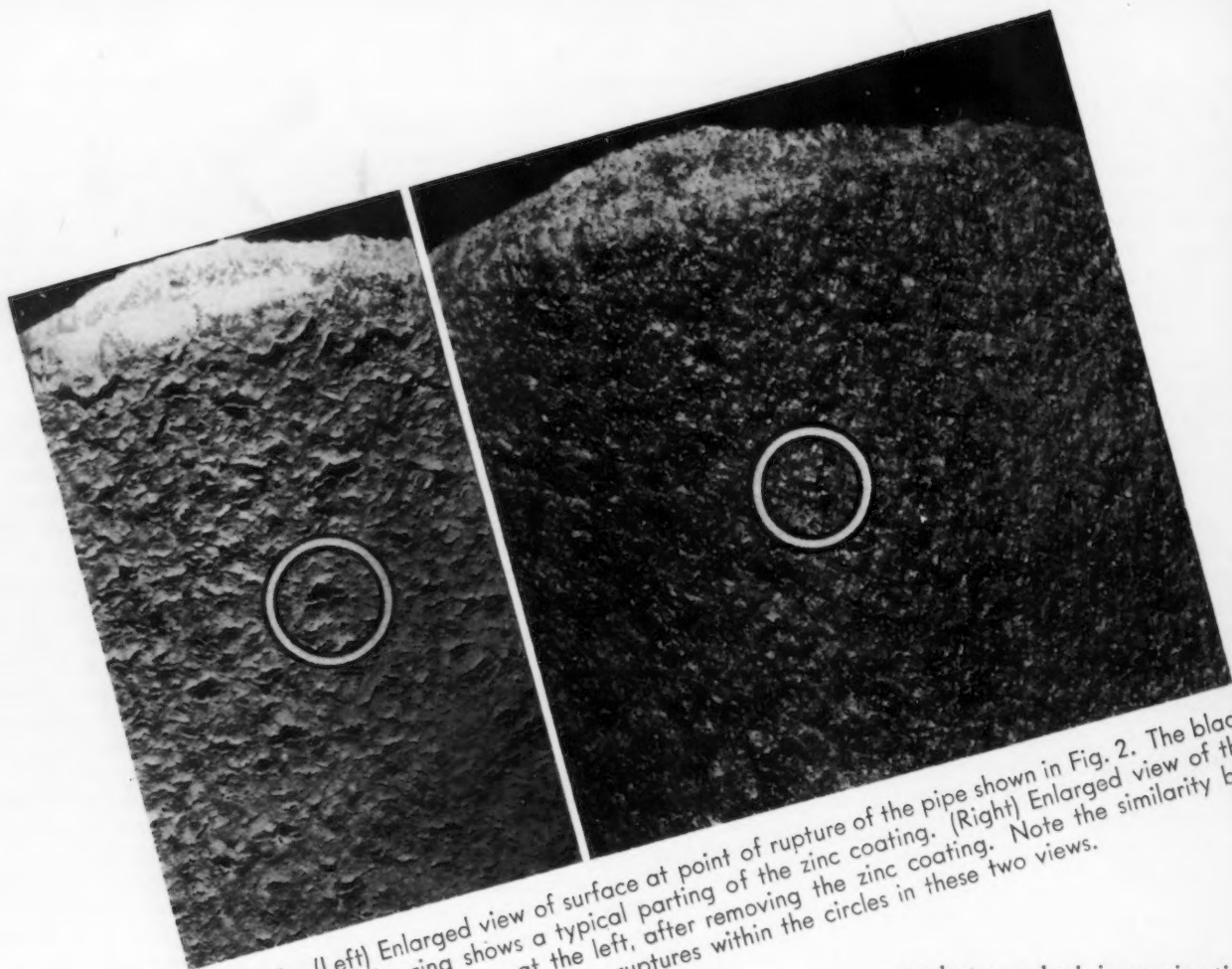


FIG. 3—(Left) Enlarged view of surface at point of rupture of the pipe shown in Fig. 2. The black spot within the ring shows a typical parting of the zinc coating. (Right) Enlarged view of the surface of the pipe shown at the left, after removing the zinc coating. Note the similarity between the surface ruptures within the circles in these two views.

quite likely the micrographs will show vertical lines indicating typical shrinkage cracks in the coating as the iron content of the alloys increases.

After the immersion time limits for a product have been established, it has been found practical to check up plant performance by means of the simple tension test to observe whether the zinc coating adheres firmly up to the point of rupture of the test piece. Fig. 2 shows two views of such test pieces of 1-in. hot galvanized pipe from regular production, where the immersion time has been held closely at about 75 sec. in zinc at 860 deg. F. This pipe is prepared with the close attention to the pickling and rinsing precautions just discussed. It is then allowed to soak in a hot zinc ammonium chloride flux wash for a half hour and then it enters the zinc kettle.

Fig. 3 shows a slightly enlarged view of the pipe surface at the point of fracture. The zinc coating has parted with the stretch of the basis steel but is still firmly adherent to the steel. No flaking of the zinc coating

has occurred. The other view in Fig. 3 shows the basis steel immediately underlying the area shown to the left. Similar cracks appear in the basis steel and indicate that the cracks in the zinc coating resulted from the pulling apart of the steel base.

Similar results are available on modern thin wall electrical conduit. The manufacturer of this type of

product can check immersion time and adherence by bending samples taken at any time from the production line to produce a test piece such as that shown in Fig. 4. An examination at low magnification will show a slight parting of the zinc at the top of the bend, and, after stripping, a parting of the basis steel directly under the same area. But there is no flaking of the zinc coating under this severe treatment.

Another product in which smoothness, ductility and adherence of the zinc coating is of primary importance is strip steel. And again the same care in pickling, rinsing, and fluxing leads to the accomplishment of the same type of result. Fig. 5 shows hot galvanized cold rolled strip 0.025 in. thick and the flexible cable housing being made from it.

In all cases, without regard to the nature of the product being dipped, the observance of these rather simple precautions in the hot galvanizing technique leads to a high quality of zinc coating.

Preparation of Flux

The author considers the best type of zinc ammonium chloride for galvanizing as having the formula $ZnCl_2 \cdot 3NH_4Cl$. When free of iron it is white; it need not contain over about 1½ per cent water as moisture.

TABLE II
ZINC AMMONIUM CHLORIDE DENSITY
[Data at 20 Deg. C. (68 Deg. F.)]

| Grams Salt in 100 c.c. Water | Deg. Baumé | Lb. of Salt in One Gal. Solution |
|------------------------------------|---------------|--|
| 10 | 7.45 | 0.79 |
| 20 | 11.8 | 1.51 |
| 30 | 15.5 | 2.16 |
| 40 | 18.7 | 2.73 |
| 50 | 21.4 | 3.26 |
| 60 | 23.6 | 3.73 |
| 70 | 25.9 | 4.18 |
| 80 | 27.8 | 4.57 |
| 90 | 29.6 | 4.96 |
| 100 | 31.0 | 5.31 |

1 deg. F. change in temperature affects the Baumé reading about 0.029 deg. Baumé.

The flux wash tank should be made of wood or lead-lined steel to keep iron contamination at a minimum. Also, any steam coil for heating the flux wash should be made of lead or Monel metal and have electrical insulating joints inserted in the feed and drain lines to avoid trouble from stray currents. The zinc ammonium chloride flux wash is an electrolyte and stray currents may lead quickly to coil corrosion unless the foregoing precaution is taken.

The flux wash is prepared simply

by dissolving the desired amount of zinc ammonium chloride crystals in the proper amount of water to produce the final volume of flux wash needed. Dissolving zinc ammonium chloride in water causes the volume to increase; consequently, if, say a final volume of 100 gal. is needed, somewhat less than 100 gal. of water must be used. Generally, when the flux wash contains less than 1½ lb. of zinc ammonium chloride per final gallon, start with a water volume equal to 90 per cent of the final volume desired.

When the final salt content lies between 1½ and 3½ lb. per gal., use water equal to 80 per cent of the final volume desired. For concentrations in excess of 3½ lb. per gal. use water equal to 70 per cent of the final volume desired.

Table II will serve as a guide in making zinc ammonium chloride flux washes.

To illustrate use of the data in Table II assume that a flux wash of approximately 18.7 deg. Baumé density is desired. Such a solution, when made, should contain 2.73 lb. of zinc ammonium chloride per final gallon. To prepare 100 gal., therefore, dissolve 273 lb. of zinc ammonium chloride crystals in 80 gal. of water. These amounts need not be absolutely exact to serve all purposes within practical limits because these flux washes perform satisfactorily over rather wide ranges of concentration. The salt dissolves easily and quickly in cold water although faster with heat. As soon as the crystals are dissolved the flux wash is ready for use.

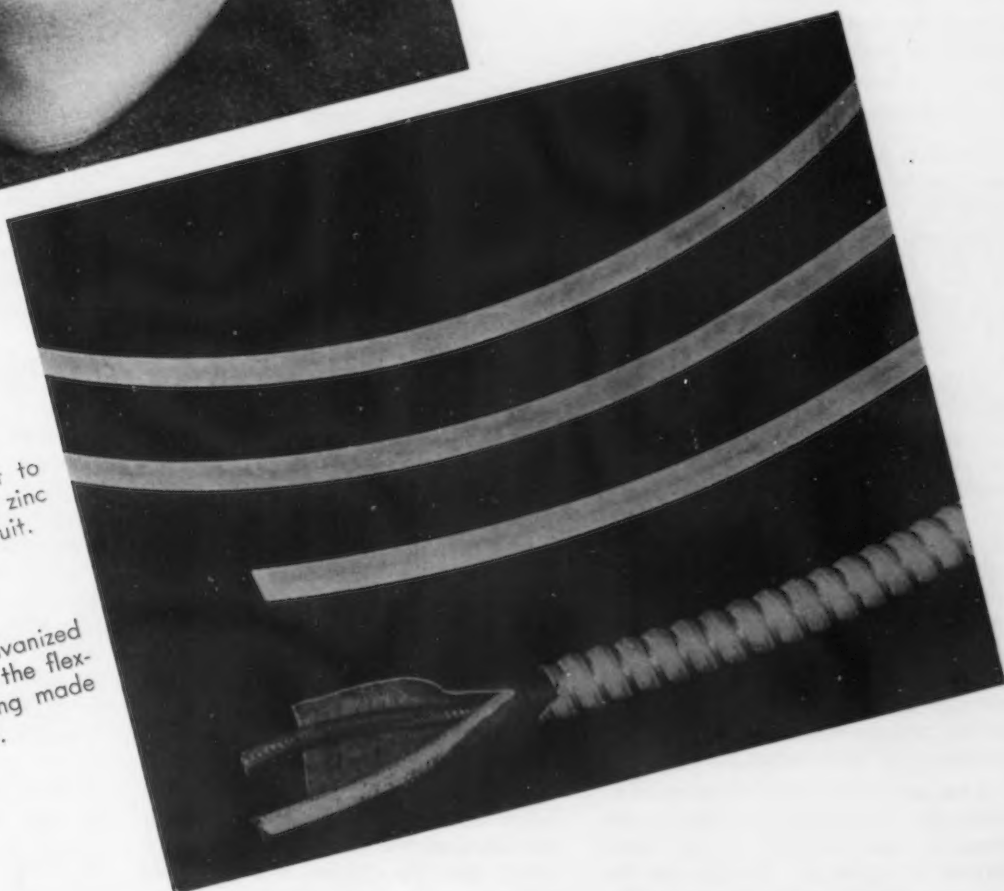
General experience has shown that it is preferable to use the flux wash at room temperature when galvanizing thin gage sheets or sheet metal wares. Caution is necessary in the case of

(CONTINUED ON PAGE 91)



FIG. 4 — Bend test to check adhesion of zinc on electrical conduit.

FIG. 5—Hot galvanized strip steel and the flexible cable housing made from it.



FOR Series L (Fe-P-V), two steels were made with 0.25 per cent V having a base composition of 0.12 per cent C, 0.65 Mn, 0.10 Si, and 0.04 S. The first one had low phosphorus (0.004 per cent), and the other 0.16 per cent P. Vanadium is similar to molybdenum in that it appears to be compatible with phosphorus.

The phosphorus-vanadium steel tested here in sheet form ran 80,000 lb. per sq. in. tensile strength, and over 65,000 lb. per sq. in. yield strength, with 21 per cent elongation in 2 in. for the normalized condition. The Charpy values of the bar stock were also satisfactory for both annealed and normalized conditions. On raising the phosphorus content from 0.004 to 0.16 per cent in the base composition, and the carbon from 0.10 to 0.14 per cent both the yield and tensile strengths were increased considerably. This is shown in the tabulation on properties of this series of steels, in Table II.

An application for patent has been filed which included the steels of this series.

In the atmospheric corrosion tests the vanadium of the first steel appeared to be moderately beneficial, while the addition of phosphorus materially improved the atmospheric corrosion resistance to that of the 0.18 per cent P steel of Series "B."

Series M (Fe-P-Cu-Si)

The first pair of steels of this series was similar to the silicon steels of series C, except that these contained 1 per cent Si. The base composition for this series was 0.06 to 0.08 per cent C, 0.50 Mn and 0.04 S. The first steel contained 0.012 per cent P and the second one 0.175 per cent P. The properties of both were satisfactory in both sheet and bar stock.

A yield strength of over 50,000 lb. per sq. in. was obtained with a tensile strength of about 70,000 lb. per sq. in. and an elongation in 2 in. of over 20 per cent. The Charpy value of the high-phosphorus steel was satisfactory even in the annealed condition. The addition of 1.0 per cent Cu to this latter steel produced a material increase in both tensile strength and yield strength while retaining adequate ductility and notch toughness in the Charpy test.

Increasing the carbon from 0.08 to 0.15 per cent increased the tensile strength still further, or to about 90,000 lb. per sq. in. In this case the elongation in 2 in. was 15 per cent for

the 22-gage sheet and 30 per cent for the bar stock. The Charpy value of the annealed bar stock was 12 ft-lb. In the very low-carbon, high-phosphorus steel the combination of 1.0 per cent each of copper and silicon seemed to be particularly beneficial if the steel is to be used in the annealed condition.

The atmospheric corrosion tests again showed the benefit of high-phosphorus content.

Series N (Fe-P-Cu-Cr-Si)

This series included an analysis that is close to one which is used for a popular low-alloy steel. The base composition of the series was 0.15 per cent C, 0.60 Mn, 1.05 Si, 0.97 Cr, 0.37 Cu, 0.04 S and 0.016 P. To this phosphorus was added to bring the totals to 0.12, 0.22, and 0.32 per cent, to give a series of four steels.

The tensile strength of the bar stock increased from 80,000 to 100,000 lb. per sq. in. and of the 22-gage sheet from 70,000 to 90,000 lb. per sq. in. as a result of the addition of 0.32 per cent P. The yield strength was increased by the same amount, or about 20,000 lb. per sq. in., so the yield strength ratio was increased by the addition of phosphorus. This is common experience with steels of this low-alloy type. The ductility values were reasonably satisfactory, even for the steel with highest phosphorus, in which case the elongation in 2 in. was 31 per cent and the reduction of area,

54 per cent. The notch behavior of the normalized steels was also satisfactory, though this was not true for the annealed steels containing 0.22 and 0.32 per cent P.

The resistance to atmospheric corrosion was also excellent. This was true of even the low-phosphorus composition which was definitely superior to low-carbon steel with 0.17 per cent P, but the steel with 0.12 per cent P and even more so the steel with 0.22 per cent P showed an additional improvement in total corrosion at the 3-year period and a deceleration in the rate of corrosion due to phosphorus. Corrosion of the latter steels during the last year had virtually stopped.

Series O (Fe-P-Cu-Ni-Mo)

The base composition of this series was 0.14 per cent C, 0.60 Mn, 0.10 Si, 1.10 Cu, 0.21 Mo and 0.63 Ni. Two steels were made containing respectively, 0.014 and 0.17 per cent P. Again phosphorus was found to exert a pronounced strengthening effect and with but a relatively small lowering of the ductility in the normalized conditions. The tensile strength of the 22-gage sheet was raised from 82,000 to 98,200 lb. per sq. in., and the yield strength from 54,800 to 65,600 lb. per sq. in. and the elongation in 2 in. was reduced only from 18 to 17 per cent by the phosphorus. Phosphorus reduced the Charpy impact value of the bar stock but not dangerously so, even for the annealed condition.

Phosphorus

By C. H. LORIG and D. E. KRAUSE
Metallurgists, Battelle Memorial Institute

IN STEEL

IN this, the second and final section of a two-part article, comprehensive data are given for the effect of phosphorus additions on the corrosion and physical properties of a number of low-alloy steels. Last week the authors detailed these effects for mild steel, and for Fe-P-Cu, Fe-P-Sn, Fe-P-Cr, Fe-P-Ni, and Fe-P-Mo alloys.

The addition of phosphorus to the base composition improved the resistance to atmospheric corrosion at the end of the 3-year period by 28 per cent. The low phosphorus base composition, which approximates that for one of the low-alloyed, high tensile commercial steels, showed the same rate of corrosion as did the low-carbon 0.17 per cent P steel of series "B." The corrosion resistance of such a steel, according to the test results, can thus be further benefited by higher phosphorus contents.

Series P (Fe-P-Cu-Ni)

A series of four steels was made with the following base composition: 0.14 per cent C, 0.60 Mn, 0.10 Si, 0.64 Ni, and 0.04 S. The first pair contained 0.38 per cent Cu and the second pair 1.23 per cent Cu. The first steel of each pair contained 0.014 per cent P and the second 0.17 per cent P, to give a low-phosphorus and a high-phosphorus steel of each composition. Similar to Series O, Series P is also representative of a commercial low-alloy steel.

The properties of all steels tested were satisfactory for both sheet and bar stock. The high-copper steel with high-phosphorus gave over 80,000 lb. per sq. in. tensile strength, while the

yield strength of the bar stock was over 60,000 lb. per sq. in. and of the sheet stock was over 69,000 lb. per sq. in., combined with elongation in 2 in. of 30 and 21 per cent respectively. The Charpy values were satisfactory, even for the annealed condition.

In the atmospheric corrosion tests the high-copper, low-phosphorus nickel steel was about as good as mild steel containing 0.17 per cent P, while the addition of phosphorus to this steel improved it still more. The effect of nickel and copper appeared to be additive in the low-phosphorus steels. The actual corrosion loss after the 3-year period for the four steels of this series and two of the steels of the "B" series are summarized in Table III.

Series Q (Fe-P-Si-Cu-Sn)

The effect of a small tin addition was studied in Cu, Cu-P, and Cu-Si-P steels. The base composition was 0.13 per cent C, 0.65 Mn, 0.21 Sn, and 0.04 S, to which were added (1) 0.36 per cent Cu, (2) 0.36 per cent Cu and 0.16 P, (3) 1.12 per cent Cu and 0.17 P, and (4) 0.36 per cent Cu, 0.94 Si and 0.18 P. Tin acted as a strengthener in (1), though but with little effect on the ductility and notch behavior. The same was found to be true for (2), though the particular steel studied was exceptionally weak in the annealed condition when subjected to the Charpy test. This was not true for a similar Cu-P steel without the tin. Steels (3) and (4) of this series showed the same notch sensitivity in the Charpy test and it appears that tin reinforces the tendency of phosphorus to produce this effect although the normal ductility is still on a high level. Except for this characteristic, all three of these phosphorus steels were found to be of good quality.

The atmospheric corrosion tests developed nothing unusual. Raising the phosphorus content of the 0.2 per cent Sn, 0.3 Cu steel from 0.014 to 0.17 per cent improved the corrosion resistance moderately. The tin, copper, low-phosphorus steel was in itself

quite resistant to corrosion, being better in this respect than plain copper or plain tin-bearing steels. Silicon did not improve the corrosion resistance of tin, copper, phosphorus steel.

Series R (Fe-P-Cu-Cr)

This series developed one composition with very fine mechanical properties and excellent resistance to atmospheric corrosion. The series contained four steels, based on 0.50 per cent Mn, 0.90 Cr, 0.10 Si, and 0.04 S.

The first steel contained 0.43 per cent Cu with low phosphorus. The second steel was the same as the first with 0.18 per cent P. The phosphorus in this steel raised the tensile strength about 12,000 lb. per sq. in. in both the bar stock and sheet but had no effect on yield strength. This lack of effect of phosphorus on yield strength is difficult to account for in view of the normal effect of phosphorus on this property. The second pair of steels of this series contained 0.85 per cent Cu and here the addition of 0.17 per cent P appears to be decidedly beneficial. With 0.07 per cent C and a simple normalizing treatment at 1625 deg. F. this steel developed a tensile strength of 80,000 lb. per sq. in., a yield strength of 58,500 lb. per sq. in. and elongation in 2 in. of 35 per cent, and a Charpy value of 55 ft.-lb. Normalizing this steel at 1725 deg. F. reduced the properties slightly. The tensile properties of the annealed steel ran about the same, while the Charpy value was still 28 ft.-lb.

In the atmospheric corrosion tests the decelerating effect was so pronounced that the rate of corrosion between the second and third year was only 23 per cent as rapid as that found for mild steel. These steels were almost identical in their corrosion resistance with those for the low-carbon copper steels of series "F," corrosion loss curves for which are shown in Fig. 3 (published last week). According to the current tests, the chromium had no measurable influence on the corrosion losses for steels of series "R." This is an interesting observation in view of the fact that one of the commercial low-alloyed steels (composition represented by series N) has the same amount of chromium, copper, and phosphorus as do the steels of series "R" and in addition has 0.5 to 1.0 per cent Si. It is apparent that silicon alters the corrosion behavior of the chromium, copper, phosphorus steel considerably, although this would not be anticipated from the effect of silicon observed in other types of steel

TABLE II
Physical Properties of Phosphorus-Vanadium Steels, Series L

| Steel No. | Analysis, Per Cent | | | | | Type Material Tested | Tensile Strength, Lb. Per Sq. In. | Yield Strength, Lb. Per Sq. In. | Elong. in 2 In., Per Cent | Reduction of Area Per Cent | Charpy Impact, Ft-Lb. | Heat Treatment |
|-----------|--------------------|------|------|-------|------|----------------------|-----------------------------------|---------------------------------|---------------------------|----------------------------|-----------------------|----------------|
| | C | Mn | Si | P | V | | | | | | | |
| L-1 | 0.10 | 0.65 | 0.10 | 0.004 | 0.23 | Bar | 64,000 | 47,000 | 33 | 72 | 51 | N-1 |
| | | | | | | Stock | 58,000 | 39,000 | 38 | 73 | 52 | A-1 |
| | | | | | | Sheet | 68,700 | 53,700 | 25 | .. | .. | N-2 |
| | | | | | | | 61,000 | 55,500 | 28 | .. | .. | A-2 |
| L-2 | 0.14 | 0.65 | 0.10 | 0.162 | 0.23 | Bar | 79,000 | 56,500 | 34 | 65 | 30 | N-1 |
| | | | | | | Stock | 73,000 | 50,000 | 34 | 65 | 29 | A-1 |
| | | | | | | Sheet | 80,000 | 65,000 | 21 | .. | .. | N-2 |
| | | | | | | | 86,800 | 76,800 | 14 | .. | .. | A-2 |

N-1 Normalized ½ hr. at 1725 deg. F., air-cooled; A-1 annealed ½ hr. at 1725 deg. F., furnace-cooled; N-2 normalized 5 min. at 1650 deg. F., air-cooled; A-2 box annealed 4 hr. at 1350 deg. F., furnace-cooled.

and particularly those containing no chromium. Silicon and chromium when together even in minor quantities appear to add greatly to the corrosion resistance of the low-alloyed steels.

Series T (Fe-P-Cu-Mo)

Four steels were made for this last series with a base composition of 0.10 per cent C, 0.45 Mn, 0.22 Mo, 0.04 Si and 0.04 S. The first pair of steels contained 0.77 per cent Cu and the second pair 0.31 per cent Cu, while the first steel of each pair was low in phosphorus and the second ones contained 0.18 and 0.17 per cent respectively.

Studies of the mechanical properties showed the normal improvement in tensile and yield strengths resulting from increasing the phosphorus content. The high-phosphorus steels had excellent ductility and notch impact values in both the normalized and annealed conditions. Their low susceptibility to notch brittleness on annealing, due probably to the molybdenum, was significant. The resistance to atmospheric corrosion of steels of this

series was also satisfactory. The base steels after 3-year exposure showed corrosion losses that were 30 per cent less than for low-carbon low-phosphorus steel. Adding 0.18 per cent P to the base steels improved the corrosion resistance to a point where it was 10 per cent better than for low-carbon steel of the same phosphorus content.

Summary of Results

This investigation brings out several beneficial effects of phosphorus as an alloying element in the low-carbon steels. These may be summarized as follows:

(1) The tensile strength and yield strength of plain and alloyed steels both increased with the addition of phosphorus. Due to the more pronounced effect on the yield strength, the "yield ratio" is increased, as compared with mild steel, with the result that phosphorus increases the amount of useful or available strength of the steel.

(2) With low-carbon steels, both plain and alloyed, this increase in strength can be secured with but little sacrifice in static ductility. Thus in the air-cooled condition we secured values for elonga-

tion of 2 in. of 20 per cent and above while corresponding values for the low-phosphorus steels ran only 3 to 8 per cent higher in most cases.

(3) The resistance to atmospheric corrosion was materially improved by alloy additions of phosphorus. Thus we found that at the end of the 3-year exposure period 0.15 to 0.20 per cent P improved the corrosion resistance of low-carbon steel by about 40 per cent, of many low-alloy steels by about 25 to 30 per cent, and of some of the most highly alloyed steels by about 15 per cent. Another means often used for expressing the relative corrosion resistance between steels is to compare them for a given loss in weight. On this basis and after 3 years of exposure the 0.15 to 0.20 per cent P steels were from two to three times more corrosion resistant than low-phosphorus plain-carbon steels, and from 1.2 to 1.5 times more corrosion resistant than low-phosphorus steels of the copper-bearing type.

By extending the test period up to three years we found the additional benefit of phosphorus of decelerating corrosion to a rate of about one-quarter that of plain steel. These effects of phosphorus on the corrosion resistance of steels have been observed by others. The only adverse data we have seen as to the effect of phosphorus on the atmospheric corrosion resisting properties of steels were given by Jones¹⁰ in his paper before the Iron and Steel Institute (British) in 1937. Jones concluded, after exposing a series of phosphorus steels to the atmosphere for a period of only 28 days, that there was no evidence to indicate that a high-phosphorus content confers any useful increase in the resistance to corrosion. As a number of discussers of his paper pointed out, such a short exposure rarely gives more than an indication of the effect of composition changes and certainly is of no value in comparing the relative corrosion resistance of different low alloyed steels.

A tabulation of mechanical and corrosion test results of some of the more

TABLE III
Corrosion Tests For P and B Series

| Steel | Composition, Per Cent | | | | | | Corrosion Loss 3 Years, Mg. Per Sq. Cm. | | |
|-------|-----------------------|------|------|------|-------|------|---|------------|---------|
| | C | Mn | Si | Ni | P | Cu | Annealed | Normalized | Average |
| P-1 | 0.14 | 0.60 | 0.10 | 0.64 | 0.015 | 0.38 | 60.8 | 56.5 | 58.65 |
| P-1 | 0.14 | 0.60 | 0.10 | 0.64 | 0.175 | 0.38 | 42.7 | 42.5 | 42.60 |
| P-3 | 0.14 | 0.60 | 0.10 | 0.64 | 0.014 | 1.23 | 52.8 | 58.9 | 55.85 |
| P-4 | 0.11 | 0.60 | 0.10 | 0.64 | 0.175 | 1.23 | 42.8 | 43.4 | 43.10 |
| B-1 | 0.13 | 0.58 | 0.09 | .... | 0.008 | .... | 91.8 | 79.4 | 85.60 |
| B-2 | 0.12 | 0.58 | 0.09 | .... | 0.169 | .... | 51.5 | 51.0 | 51.25 |

interesting phosphorus steels is given in Table IV. The mechanical tests of the bar stock were generally more favorable but it is thought that there will be more interest in the sheet tests. These results show that there was readily obtained yield strengths of over 50,000 lb. per sq. in., with good ductility and Charpy values. This is true in all cases for the normalized or air-

the tensile and yield strengths, and the yield ratio, or to exert its own specific effects on various engineering requirements as, for example, the ability of the steels to be welded and fabricated. Yet for phosphorus to take its place with other alloying elements in the compounding of steels there is still much work to be done on phosphorus steels as regards their production,

⁶ P. Hoff, "The Development of High Strength Steels for Large Steel Structures," *Mitteilungen der Kohle- und Eisenforschung G.m.b.H.*, Vol. 2, part 1, 1938, pp. 1 to 82.

⁷ K. Dawes, "Further Development of Weather-Resisting Steels," *Archiv für das Eisenhüttenwesen*, Vol. 9, July, 1935, pp. 37 to 45.

⁸ S. Epstein, J. H. Nead and J. W. Halley, "Choosing a Composition for

TABLE IV
Tests of Phosphorus Alloy Steel Sheets

| Series | Composition, Per Cent | | | Normalized 22-Gage Sheet | | | Key-Hole Charpy | | Corrosion Data | | | Type |
|--------|-----------------------|------|---------------------------------|---------------------------------|---------------------------------|-------------------------------|----------------------------|--------------------------|--|------------------------------|---------------|------|
| | C | P | Others | Tensile | Yield | Elonga- | Normal- ized Ft.—Lb. | An- nealed Ft.—Lb. | Corrosion | Corro- dibility Index* | | |
| | | | | Strength, Lb. Per Sq. In. | Strength, Lb. Per Sq. In. | tion, Per Cent In 2 In. | | | Loss, 3-Yr. Av. Mg. Per Sq. Cm. | | | |
| A | 0.03 | 0.21 | | 53,800 | 38,500 | 18 | 54 | 5 | 52 | 63 | Fe-P | |
| B | 0.12 | 0.17 | | 64,500 | 40,700 | 21 | 37 | 30 | 51 | 62 | Fe-C-P | |
| B | 0.12 | 0.31 | | 74,900 | 49,000 | 21 | 23 | 10 | 43 | 53 | Fe-C-P | |
| C | 0.12 | 0.18 | Si = 0.41 | 75,000 | 49,200 | 21 | 31 | 26 | 54 | 66 | Fe-P-Si | |
| D | 0.12 | 0.18 | Mn = 1.3 | 79,000 | 51,400 | 22 | 41 | 5 | 50 | 61 | Fe-P-Mn | |
| F | 0.14 | 0.17 | Cu = 1.17 | 73,100 | 59,300 | 21 | 27 | 4 | 45 | 55 | Fe-P-Cu | |
| I | 0.13 | 0.18 | Cr = 0.94 | 73,600 | 57,900 | 20 | 39 | 24 | 47 | 57 | Fe-P-Cr | |
| J | 0.13 | 0.18 | Ni = 0.56 | 67,600 | 55,700 | 15 | 31 | 27 | 47 | 57 | Fe-P-Ni | |
| K | 0.12 | 0.18 | Mo = 0.24 | 77,500 | 52,200 | 23 | 35 | 29 | 48 | 58 | Fe-P-Mo | |
| K | 0.12 | 0.18 | Mo = 0.51 | 92,200 | 58,700 | 21 | 36 | 27 | 51 | 62 | Fe-P-Mo | |
| L | 0.12 | 0.16 | V = 0.23 | 80,000 | 65,900 | 21 | 30 | 29 | 50 | 61 | Fe-P-V | |
| M | 0.08 | 0.17 | Cu = nil; Si = 1.01 | 75,400 | 56,300 | 21 | 35 | 26 | 50 | 61 | Fe-P-Cu-Si | |
| M | 0.08 | 0.17 | Cu = 1.0; Si = 1.01 | 80,900 | 63,300 | 15 | 30 | 17 | 47 | 57 | Fe-P-Cu-Si | |
| M | 0.16 | 0.18 | Cu = 1.0; Si = 1.01 | 94,000 | 79,700 | 15 | 22 | 12 | 48 | 58 | Fe-P-Cu-Si | |
| N | 0.15 | 0.22 | Cu = 0.37; Si = 1.05; Cr = 0.97 | 79,300 | 56,100 | 21 | 29 | 7 | 33 | 40 | Fe-P-Cu-Cr-Si | |
| O | 0.14 | 0.17 | Cu = 1.16; Ni = 0.63; Mo = 0.21 | 98,200 | 65,600 | 17 | 24 | 20 | 39 | 47 | Fe-P-Cu-Ni-Mo | |
| P | 0.14 | 0.17 | Cu = 1.23; Ni = 0.64 | 83,800 | 69,300 | 19 | 27 | 20 | 43 | 53 | Fe-P-Cu-Ni | |
| R | 0.16 | 0.18 | Cu = 0.43; Cr = 0.90 | 81,500 | 53,500 | 20 | 34 | 18 | 49 | 60 | Fe-P-Cu-Cr | |
| R | 0.07 | 0.17 | Cu = 0.85; Cr = 0.90 | 86,900 | 53,900 | 25 | 55 | 28 | 43 | 53 | Fe-P-Cu-Cr | |

* Corrodibility index = $\frac{\text{Loss in wt. mg. per sq. cm.} \times 100}{\text{Loss in wt. mg. per sq. cm. for 0.006 per cent P ingot from iron of Series A.}}$

cooled condition. Several of the steels were found to be notch brittle in the annealed condition, as has been commented upon by others, but several elements were found to combat this behavior, particularly chromium, nickel, molybdenum, and vanadium. On the other hand, it is only the annealed condition that manifested this type of brittleness with the amounts of phosphorus used.

The information presented in this paper adds to the knowledge of the value of phosphorus as an alloying element. Phosphorus now appears as an alloying element in several commercial low-alloyed steels, for very good reasons. The industry will doubtlessly see its application extend to many other types of steels to enhance resistance to atmospheric corrosion,

their engineering properties and their metallurgy.

REFERENCES

- ¹ C. H. Lorig and D. E. Krause, "Phosphorus as an Alloying Element in Low Carbon, Low Alloy Steels," *Metals and Alloys*, Vol. 7, 1936, pp. 9 to 13, 51 to 56, 69 to 73.
- ² H. W. Gillett, "Phosphorus as an Alloying Element in Steel," *Metals and Alloys*, Vol. 6, 1935, pp. 280 to 283, 307 to 310.
- ³ V. V. Kendall and E. S. Taylerson, "A Critical Study of the A.S.T.M. Corrosion Data on Uncoated Commercial Iron and Steel Sheets," *Proc. A.S.T.M.*, Vol. 29, 1929, part 2, pp. 204 to 219.
- ⁴ A. Ristow, "On the Effect of Phosphorus on the Properties of Basic, Unalloyed Steel," *Mitteilungen der Kohle- und Eisenforschung G.m.b.H.*, Vol. 1, part 4, 1935, pp. 49 to 84.

Low-Alloy, High Strength Steel," *Trans. American Institute of Mining and Metallurgical Engineers, Iron and Steel Division*, Vol. 120, 1936, pp. 309 to 345.

⁵ W. Stinnes, "On the Influence of Sulphur and Phosphorus Contents on the Corrosion of Steel," Dissertation for degree of Doctor of Philosophy, Westfälischen Wilhelms Universität, June 23, 1937, 24 pages.

⁶ S. C. Britton, "Some Properties of Commercial Steel Sheets Containing Additions of Copper, Manganese, Chromium, and Phosphorus," *Journal Iron and Steel Institute*, Vol. 135, No. 1, 1937, pp. 161 to 185.

⁷ J. A. Jones, "The Effect of Phosphorus on the Mechanical and Corrosion-Resisting Properties of Low-Carbon and Low-Alloy Structural Steels," *Journal Iron and Steel Institute*, Vol. 135, No. 1, 1937, pp. 113 to 160.

Polishing Technique for STAINLESS STEELS

By WALTER M. MITCHELL

Metallurgical Engineer, Westfield, N. J.

LAST week the author reviewed the various types of stainless alloys, the range of commercial finishes, types of grits, preparation of wheels, etc. Herein, in the second section of a two-part article, detailed data are given for polishing to various finishes; also, etching and protection of stainless surfaces.

IN all polishing operations pressure should be as light as possible, and never greater than is required to cut efficiently. The time required to produce a given finish will not be shortened by attempting to force operation through increased pressure. For, excessive pressure will invariably overheat the surface and result in spoiled finishes and buckling. The latter is particularly true if austenitic steels in light gages are mishandled.

Nor are attempts to shorten operations by omitting intermediate steps likely to be more successful. Fine abrasives and buffing compounds will not remove metal, nor cut to the bottom of scratches or cuts remaining from coarse abrasives. Unless these are removed in steps with suitable intermediate abrasives they will always remain and spoil what might otherwise have been an attractive finish.

In beginning polishing operations on No. 1 finish, or its equivalent, the first step is "roughing." For this, No. 80 abrasive dry on a glued wheel should be used. If the surface is very rough and uneven, a coarse grit, such as No. 60 may even be necessary. All imperfections of the original surface, or those that may have opened up, must be completely removed in this operation. A sufficiently coarse grit to "make bottom" should be used, but grit coarser than necessary should be avoided as deep scratches take much time to smooth out. The purpose of roughing is to produce a uniform "base" or "ground" on which the final finish may be built up. Failure to produce this ground at this stage in the operation will result in much waste of time later on.

The No. 80 should be followed with No. 100, dry. All scratches and lines produced in roughing must be removed in this second operation. While finer abrasives may be used dry after the No. 100, it is best to proceed with Turkish emery (or aluminum-oxide) on a suitable wheel and apply lubricant to the surface being polished. A good succession will be No. 120, No. 150, No. 180, No. 200 or No. 220 Turkish emery with grease. For a more brilliant finish, operations may be carried through with abrasives of higher numbers up to, and including No. 440 with grease. This will produce a very attractive finish, almost

mirror in quality. Sheets and strip with cold rolled finish (No. 2B or No. 2D), or articles formed from these that have not been annealed or pickled, will rarely require coarse abrasives unless marked by tools or dies, and greasing may proceed at once using No. 120 Turkish emery.

Wheels for the finer abrasives are made up of sewed sections, bonded together, but with greater cushion than wheels used dry for roughing. Finer count, 80/92, or 84/92, unbleached muslin is generally used, and the insertion of cardboard disks, or worn down sections, as spacers is sometimes advisable to prevent overheating. Where wheels have been greased, cleaning is accomplished by holding a lump of pumice against the rotating wheel until it is thoroughly cleaned. Fresh abrasive can then be applied, as necessary.

If the commercial No. 4 finish is desired, all surface defects must be removed by roughing operations and the surface finished to uniform ground with No. 100 grit dry. Following this, No. 120 with grease is used. In some cases to match an existing No. 4 finish, it may be necessary to go as high as No. 150 with grease.

To produce the No. 7 finish, No. 120 is followed with Nos. 180, 220, 240, 320, and 400. This finish, as produced commercially by different mills, will vary considerably. It is not neces-

sarily scratch free, but has very much higher reflective power than the No. 4. If final buffing is to follow polishing and a true mirror finish (No. 8) is desired, operations should be carried through Nos. 240 or 280 with grease before buffing compounds are used.

For fine polished and satin finishes special abrasive mixtures, known commercially as "greaseless compounds" (Lea compounds), are now coming into use for stainless steels. These take the place of the finer abrasives on set-up wheels used with lubricant. They are mixtures of various grades of abrasive and glue with a non-drying ingredient, and are prepared for the market in stick form. They have the advantage in being ap-

nomical procedure for a particular job.

Tampico and Satin Finishes

Finishes of this type are highly desirable for many kinds of work and can be produced at considerably less cost than the brilliant mirror finishes, which require the expenditure of much time and labor. With the extensive variety of abrasive available, the character of the final finish can be modified to meet practically any requirement, from a coarse dull appearance to a bright satin finish, similar to that found on high grade silverware.

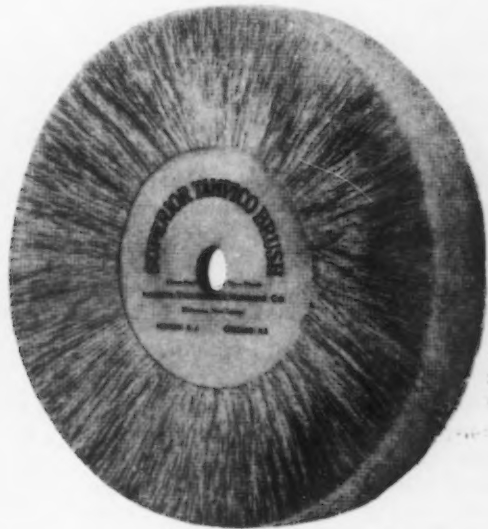
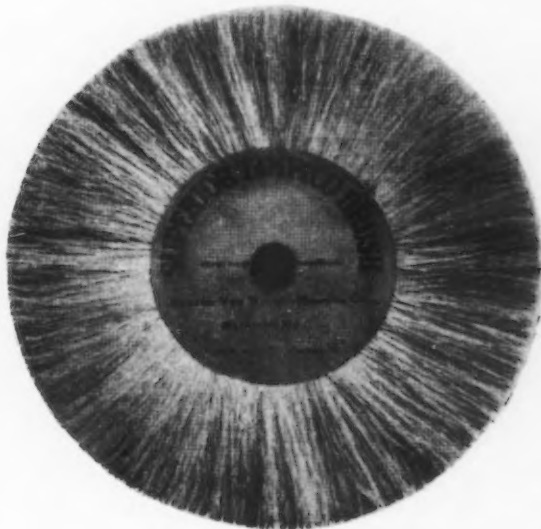
Satin finishes have the advantage of blending in with die marks and

producing various satin finishes on hollow-ware, novelties, or other articles. These are used on soft muslin buffs at surface speeds of 5000 to 6000 linear ft. per min.

Obviously, whatever method is used in producing the finish, the lines in tampico, or satin, finishes should run in the same direction as the original rolling of the material, or, in the case of small articles, in the same direction as the previous polishing operation.

In tampico brushing large surfaces, such as may be used in architectural work, it is necessary that polishing equipment be so designed that the brush, or wheel, can travel the full length of the work in one stroke. If it is necessary to stop and start again

• • •
TAMPICO brushes made by Hanson-Van Winkle - Muning Co. This type of brush can be used with emery paste for polishing, particularly backgrounds which cannot be reached with a polishing wheel.
• • •



plied directly to the rotating fabric wheel and produce a flexible, dry abrasive surface. Since they do not require glue, or cement, or drying time, they are very convenient, and their use will frequently lower finishing costs. They contain no grease, nor is it required, and cleaning of polished articles is much simplified.

Wheel speeds for polishing should range between 6000 and 8000 linear ft. per min. (about 1600 to 2100 r.p.m. for a 14-in. wheel), the higher speed being used with the finer abrasives. With "greaseless compounds" somewhat lower speeds are recommended.

These suggestions are to be considered as general only. As previously stated, hard and fast rules that will apply in every case cannot be given, and experimentation with various successions of abrasives will frequently be necessary to develop the most eco-

other minor imperfections, and their removal is not as important as when buffing for a mirror finish. Nevertheless, for best results all conspicuous defects must be removed, by methods already given, and finishing operations carried through No. 120 grit with lubricant. That is, the surface should have at least a No. 4 finish before satin finishing is begun.

The commercial No. 6 finish (tampico brushed) is produced by brushing the surface with a rotating brush of tampico fiber, or bristle, loaded with "emery paste" (about No. 180 grit) and light oil. In some cases Italian pumice and kerosene are used. A few passes are usually all that are required, the operation consuming a few minutes only.

The "greaseless compounds" are used with excellent results for pro-

brush marks will remain and spoil the appearance of the work.

Buffing Abrasives and Wheels

The purpose of buffing is to produce a *true* mirror finish, entirely free from polishing lines, or scratches. This can be accomplished on stainless steels by the use of special abrasive buffing compounds prepared for the purpose only. In contrast to polishing, the abrasive is not glued, or cemented, to the wheel, but is applied to the revolving buff in the form of a compound of the abrasive with a binder (lubricant).

Buffing compounds are frequently called "rouges," which, for stainless steels is a misnomer since they contain no iron whatever, and are compounds of levigated alumina or chromic oxide (Cr_2O_3).

Buffing usually resolves itself into

two operations: "cutting down" and "coloring," for which separate abrasives are required. For cutting down a sharper compound is used which reduces the rough surface to a smoother one, as preparatory to coloring. Coloring is done with a milder abrasive, frequently green chromic oxide, which produces the highest quality finish. The abrasive in cake or stick form is applied directly to the face of the rotating wheel.

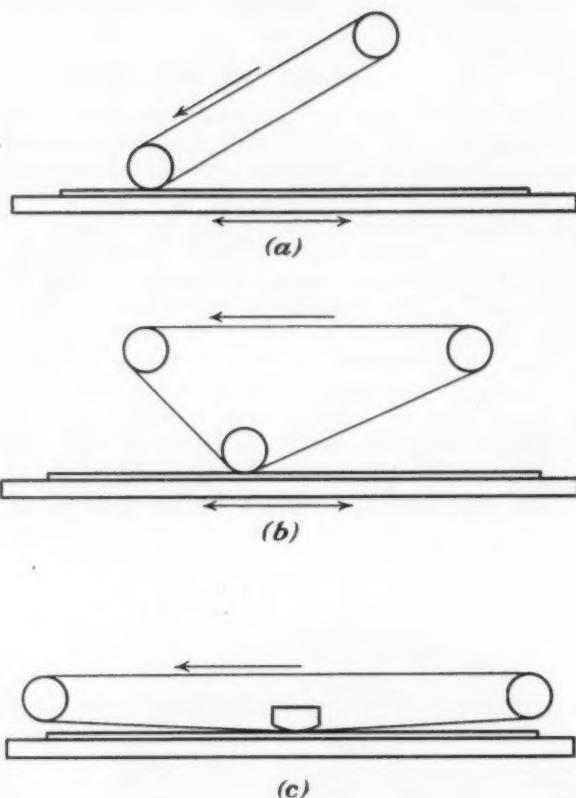
As in polishing, it is inadvisable to attempt to shorten the time required in buffing operations by increasing pressure. To do so may burn the surface and ruin careful preliminary work. Pressure in buffing plays a very minor part, the cutting action depending almost entirely on the supply of abrasive and the velocity of the wheel.

Buffing can easily develop into a costly and time consuming operation, especially in the final steps of producing a perfect, scratch free, mirror finish. Much of the time and cost of buffing can be avoided by intelligent and careful procedure in the preliminary grinding and polishing, particularly the avoidance of anything that might produce deep scratches and overheating.

Raw material for buffing, whether sheets or strip, must be highest quality, without deep seams or imperfections, as the slightest defects remain conspicuously visible and ruin an otherwise good finish. It is not recommended that buffing be attempted over ground coarser than No. 240 or No. 280 with lubricant.

Success in buffing depends also on the use of the proper type of wheel. Buffs are usually made from high count 84/92 bleached muslin, or linen. For the first, or cutting down, operation, the sections may be sewed for one or two rows around the arbor hole. For the second operation, or color buff, unsewed sections are preferred. The wheel should be quite loose and soft, but will become sufficiently hard when rotating at high speed. Ventilation, or cooling effect, is secured by inserting spacers of cardboard, or worn down sections.

There are now special "ventilated" buffs on the market (Airway ventilated buffs) which are constructed with rigid center disks of metal. Long strips of 84/92 unbleached sheeting are used, one side of which is gathered in and fastened to the central disk. In this way the cloth, which is gathered tightly at the center flares at the circumference and forms a series of folds, or pockets. As the



THREE types of machines for polishing large sheets or plates of stainless steel. In (a) and (b) the work moves under the roll, and in (c) the work is stationary while the belt passes close to the surface and contact is made by pressing the belt down with a block.

buff rotates the centrifugal force draws air in at the center and forces it out radially between the sections, thus giving true ventilation.

Buffing wheels are used at high velocities—about 9000 to 10,000 linear ft. per min. (2500 to 2800 r.p.m. for a 14-in. wheel). Higher speeds are permissible, but must be used with great care as burning is very likely to occur.

Sheets and Plates

Although the average fabricating plant will usually purchase large sheets or plates already polished from the mill and have little occasion for attempting work of this character, a short description of the methods used will not be out of place.

In polishing large surfaces, such as sheets or plates, machines carrying rotating belts charged with abrasive are now generally used. The belts are made of paper for narrow widths, and of cloth, or canvas, for wider widths where greater strength is required, up to 50 to 60 in. or more.

There are several arrangements of belts and pulleys, shown schematically in the accompanying illustration. Machines of types (a) and (b) operate somewhat similarly to the ordinary machine shop planer; that is, the sheet, or plate, is clamped flat to a table which moves back and forth un-

der the roll, or pulley, around which the belt travels. The roll, which forces the moving belt into contact with the sheet, is made up of sewed buffs to provide the cushion effect required.

In machines of types (c) the work is stationary while the belt passes longitudinally close to the surface. Contact is made by pressing the moving belt down on the surface of the sheet with a cloth covered cork block. By varying the width of the belt, i. e., by using a narrow belt and a small block, this machine is conveniently adapted for "hand spotting" to remove pits and other small imperfections.

Any of the belt machines may be used dry, or with lubricant. In some types, most conveniently with type (c), a water cooled bed can be provided to prevent overheating and burning.

Prepared belts already coated with abrasive can be purchased from commercial houses, and are made up to order in a given width and length. Or, if desired, belts can be coated in the shop, but, on account of the difficulties involved in securing an even, uniform, coating of abrasive the purchase of factory coated belts is strongly recommended.

The polishing of large sheets, plates, or strip in the flat usually resolves itself into four operations:

Rough grinding, hand spotting, intermediate grinding, and finishing.

ROUGHING: The abrasive used in this operation will depend on the character of the original surface. For the average No. 1 finish, a paper or cloth belt with No. 36 aluminum-oxide is used at a speed of about 3000 linear ft. per min. A medium lubricant should be used, that is a mixture of palm oil and kerosene is satisfactory. If the belt is new the proportion of palm should be large, but as the belt wears down more kerosene should be added. For machines of types (a) and (b) a table speed of 40 to 45 ft. per min. will be satisfactory.

HAND SPOTTING: No. 60 abrasive paper in narrow widths is used on a type (c) machine at a speed of about 1800 ft. per min. No lubricant is required. The success of spotting depends largely on the skill of the operator in handling the block. Too much pressure will cause excessive heating of the spot being ground so that expansion will take place, the result being localized distortion which is practically impossible to remove.

After this operation it is customary to stretcher-level for flatness.

INTERMEDIATE GRINDING: For this a No. 60 aluminum-oxide belt is used, either paper or cloth, at a speed of about 3000 linear ft. per min. Palm oil is a satisfactory lubricant. Table speed is about 40 to 45 ft. per min. The amount of grinding necessary in this operation will depend on how completely and satisfactorily the imperfections have been removed in the previous hand spotting operation.

FINISHING: For this operation a paper belt is used with No. 120 aluminum-oxide at a speed of about 3300 ft. per min. Tallow is recommended as a lubricant, and is applied to both the belt and the sheet. The speed of table travel should be about 40 ft. per min. If properly performed, this operation, under the conditions just given, will produce the standard commercial No. 4 finish. About four or five passes will be required for finishing.

The heat generated by the friction of polishing may cause distortion and buckling in light gage sheets so that the sheets are no longer flat. To restore flatness it is customary practice to reverse the sheet and take a few passes on the other side. This causes distortion in the opposite direction and, if properly done, a flat sheet will be the final result.

To produce the No. 7 finish, the

No. 4 finish is ground consecutively with Nos. 240, 320, and 400 aluminum oxide, or silicon carbide, belts at speeds around 3500 ft. per min., using tallow as a lubricant. This is followed by a buffing operation using chrome oxide rouge, applied sparingly to a well ventilated buff running at about 10,000 linear ft. per min.

To produce the No. 8 finish on large surfaces is an exceedingly difficult operation. That is, if a true mirror finish, without scratches, is desired. It is practically necessary to change the direction of polishing in each operation in order to eliminate completely the scratches from the previous operation, and this requires suitable polishing equipment. For small surfaces, the procedure given previously under "buffing" should be followed. Unless suitable polishing equipment is available, and first quality material on hand, mirror polishing of large surfaces is best not attempted.

TAMPICO OR BRUSH FINISH: To produce the No. 6, or tampico finish, on large sheets or plates is a comparatively simple matter, provided proper equipment is available. The most important item in this is a rotating brush of tampico, or bristle, with face as wide as the sheet, or surface, to be brushed, which is mounted suitably over a traveling bed, or table. If the whole width of the sheet cannot be covered at one pass brush marks and streaks will likely remain and spoil the surface which, for proper effect, must be absolutely uniform.

Material to be brushed, whether



AIRWAY ventilated buff made by Jackson Buff Corp. This buff stays cool even at high speeds, is a fast cutter and does not ridge the work. The construction prevents raveling and considerable saving on compound is claimed.

sheets, plates, or strip must have at least a No. 4 finish and be perfectly flat. The brush should have a speed of 1800 to 2000 linear ft. per min. For an abrasive, either "emery paste" or powdered pumice is used. This is mixed with a heavy oil and applied directly to the sheet. Pressure should be light so that only the ends of the brush fibers come into contact with the sheet surface. Two or three passes of the brush while the sheet is moved slowly back and forth under it are all that are necessary. The final finish should be entirely free from streaks or marks and of a uniform, soft, matte without reflectivity.

Etching

The development of successful etching processes for stainless steels has added greatly to their usefulness. Signs, name-plates, and material for decorative purposes in architecture are readily produced, and, when a grade of stainless steel such as 18-8 is used as a base metal, there is the advantage of complete permanence. For architectural applications, the etched surface may be overlaid with enamels of various colors, and truly artistic and distinguished ornamental material is thus made available.

Etching is usually done on polished surfaces, the higher the polish the greater the contrasting effect. Consequently, the No. 7, or the No. 8 finishes, are generally used as a base material for etching.

There are broadly two methods of etching which can be used on stainless steel—mechanical and chemical.

Mechanical methods employ an abrasive, either a charged polishing wheel, or brush, or the sandblast. Those parts of the design that are to remain bright are covered with a mask of adhesive paper, or tape, which is applied in whatever configuration is required by the design. The whole surface is then sandblasted with flint shot (must be iron-free abrasive) until the desired "etch" is obtained. By again blocking out portions of the blasted surface and sandblasting again, various grades, or degrees, of etching may be obtained giving one or more tones of shading. When the proper effect is secured the adhesive mask is removed with suitable solvent leaving those portions with their original brightness or luster.

Instead of the sandblast the tampico brush may be used. These portions of the design to remain bright are

(CONCLUDED ON PAGE 92)



CARBIDE TOOLS

NUMBER of tool styles and sizes are held to a minimum, each tool except the cut-off having a wide range of application.

ENGINEERING work over many years in tooling up new machines to specifications of users in a wide variety of industries has given the Bullard Co. an unusually broad experience with carbides, especially as applied to large-lot production of identical parts. In the belief that carbide tooling could also be employed to advantage in small-lot production, such as its own, the company has adopted such tooling

throughout its plant—on steel as well as on other materials. The problems in putting through this broad scale tooling program are outlined in this article.

In addition to the economies cited, the success of the program is credited with influencing the development of the new Cut Master vertical turret lathe which was to have been a feature of the company's exhibit at the Machine Tool Show.

AS builders of machine tools for both production and general-purpose work, we have had a good opportunity to analyse the benefits and problems of cemented carbide tool use on both types of work.

Few people today will question the benefits of carbide tools on continuous production jobs or jobs having reasonably large quantities of identical

parts to machine. Use of carbide tools on such applications is commonplace today. Numerous case studies indicate savings of such unusual magnitude that initial cost of tooling up, time spent in determining the proper carbide grades to use, adjusting speeds, feeds, etc., for maximum performance, is quickly absorbed on production runs.

On job-lot work, however, the prob-

lem is quite different. On small runs there is neither time, a sufficient quantity of identical parts, nor enough profit-margin to experiment with tool materials. On such work, to attempt to determine the best carbide grade to use, or the best combination of speeds and feeds is usually not practical. As a result, shops with small runs and diversified work have not secured benefits of carbide tool use proportionately comparable to those obtained on production jobs. In effect, the tendency has been for job shops or other shops with small runs, to use carbide tools only on applications on which difficulties are experienced with ordinary tools.

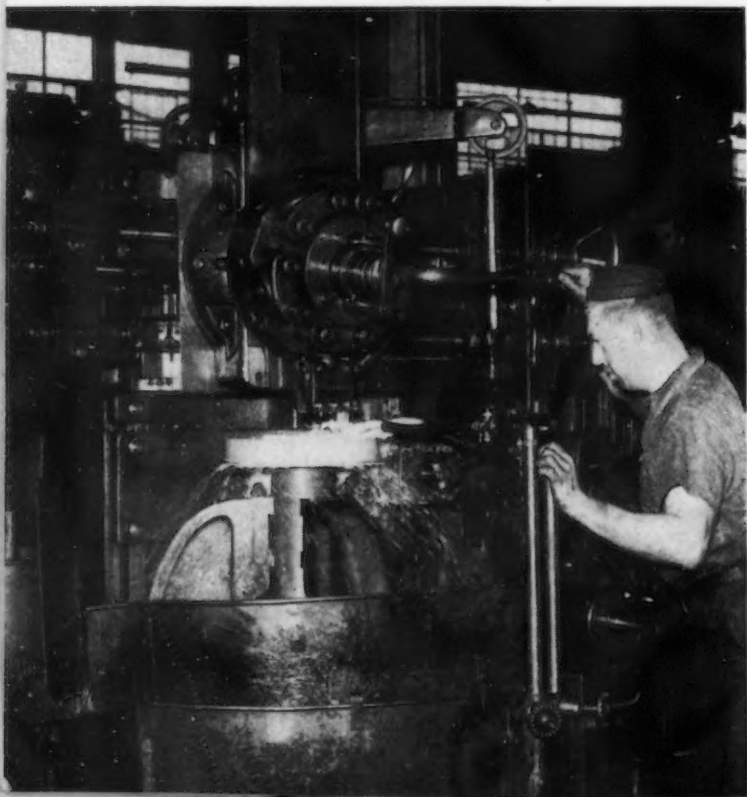
Lots Range from 6 to 200 Pieces

Although our shop is not small in the physical sense, our problems of applying carbide tools are comparable to those of the small shop or job shop in that our runs of any one part are usually in limited quantities. A 200-piece lot is a large run for us—and not infrequently an order requires as few as six identical pieces. Therefore, our use of carbide tools has been similar to that of other shops with small runs. However, we differ to some extent in that our experience in the use of carbide tools has been considerably broader due to our engineering work in tooling up new Bullard machines with carbides.

This engineering work, coupled with our first-hand observation of the large savings being obtained on production equipment already installed in the field, finally culminated in a determination to seek some economical way to apply carbide tools on small runs. We had two objectives in this. First, its success would put us in a position to materially benefit users of our general-purpose vertical turret lathes; secondly, we would obtain numerous advantages in our own shop work.

Here's how we tackled the problem:

MACHINING a 50-piece lot of S.A.E. 1045 spindles. Cutting time with high-speed steel was 55 min; with Carboloy, 18 min. Speed 282 ft. per min; feed, 0.018 in; and cut, 1/32-5/16 in. Operations: Face, turn, undercut.



ECONOMICAL ON SMALL-LOT WORK

Problem No. 1 was grade selection. There were available innumerable grades of carbides, each having its specific field of use. Obviously it would be impractical to maintain a stock of all grades in the many styles of tools used. From a practical standpoint, the stocking of two grades, or three at the most, would be economical in our plant. We decided, therefore, to determine how many grades were absolutely necessary for our work. In order to limit our problem, we confined our investigation to the grades of carbide produced by one supplier—the Carboloy Co., Inc. We found that of all Carboloy grades in use, two grades accounted for more than 75 per cent of the applications in the general field at that time.

The natural line of inquiry from this point was to find out the relative importance of, or necessity for, the other dozen or more grades used on the remaining 25 per cent of the total field applications.

Investigation revealed this interesting fact: Practically all of the grades other than the two referred to above were principally special grades developed to meet specific conditions on quantity production jobs and to increase production to the absolute maximum under those conditions. For example, on a production job on which the 8-hr. production is set at 500 pieces, grade "X" might be producing 400 pieces per grind. Obviously the use of a grade that would stand up for the full 8-hr. shift would be desirable. It would then be in order to investigate special grades to find one which has a slightly longer life.

From this it was obvious that the problem of making a selection from among these miscellaneous special grades was a problem for the plant having continuous production jobs, and of no concern to those having limited runs of identical parts.

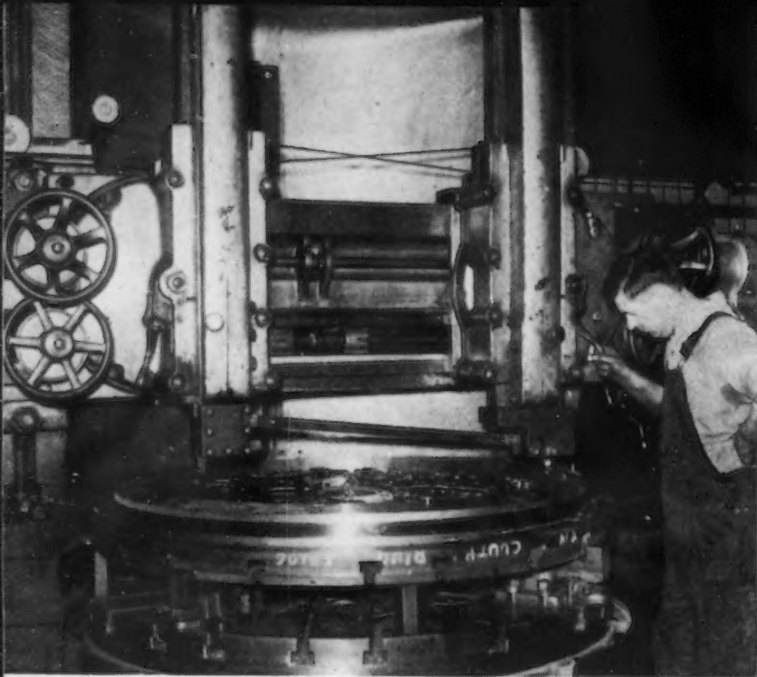
Two Grades of Carbide Used

Based on these findings, we decided to arbitrarily limit our use of grades to two general-purpose grades, one for steel and one for all other metals. We realized, of course, that in some instances we would be sacrificing the absolute maximum performance on certain jobs, but we felt that the net result for broad-scale use would be a

TABLE I—RECORD OF SAVINGS ON 22 STEEL JOBS

| Piece Name | Operation | Former Method | Present Method | Number Pieces | Savings Hours |
|-----------------------------|--------------------------|------------------|--------------------|---------------|---------------|
| Clutch Sleeve | Chuck Hole | High Speed Drill | Carboloy Drill | 150 | 9.9 |
| Feed Screw Upper | Turn Comp. to grind | High Speed Steel | Carboloy | 100 | 9.0 |
| Spindle | Turn Comp. to grind | High Speed Steel | Carboloy | 30 | 6.6 |
| Index Drive Shaft Upper | Turn Comp. to grind | High Speed Steel | Carboloy | 20 | 2.2 |
| Traverse Engaging Rod | Turn Comp. to grind | High Speed Steel | Carboloy | 140 | 7.0 |
| Turret Stud | Turn Comp. to grind | High Speed Steel | Carboloy | 30 | 3.3 |
| Long Crank Shaft | Turn | High Speed Steel | Carboloy | 23 | 1.38 |
| Short Crank Shaft | Turn | High Speed Steel | Carboloy | 30 | 1.5 |
| Pump and Index Shaft Center | Turn Comp. to grind | High Speed Steel | Carboloy | 35 | 1.75 |
| Coupling Shaft | Turn Comp. to gr. 4 dia. | High Speed Steel | Carboloy | 6 | .83 |
| Control Drum Shaft | Turn Comp. to grind | High Speed Steel | Carboloy | 25 | 4.92 |
| Bevel Pinion Shaft | Turn Complete | High Speed Steel | Carboloy | 30 | 4.5 |
| Bevel Pinion Shank | Turn Comp. to grind | High Speed Steel | Carboloy | 6 | 1.92 |
| Pinion Driven Shaft | Recenter and turn to gr. | High Speed Steel | Carboloy | 30 | 10.5 |
| Index Control Shaft | Turn Complete | High Speed Steel | Carboloy | 170 | 14.8 |
| Spindle Drive Shaft | Fin. turn to grind | High Speed Steel | Carboloy | 140 | 28.0 |
| Swivel Gear Segment | Bore and turn Complete | High Speed | Carboloy | 10 | 1.0 |
| Spindle | Turn head end to grind | High Speed | Carboloy (Partial) | 42 | 10.5 |
| Ball Race Nut | Bore and turn Complete | High Speed | Carboloy (Partial) | 30 | 6.0 |
| Driving Gear Shaft | Turn Complete | High Speed | Carboloy | 160 | 28.0 |
| Feed Rod | Turn shank end. Sq. ends | High Speed | Carboloy | 153 | 31.73 |
| Spindle Drive Shaft | Turn Comp. to grind | High Speed | Carboloy | 160 | 85.9 |

A total of 271.23 hours (one third of total former time) was saved on these 22 steel jobs. The saving more than paid for the Carboloy tools, left substantial margin in addition, and the tools have the major portion of their life remaining. One general purpose Carboloy grade did all jobs.



• • •

MACHINING a five-piece lot of 0.60-0.70 carbon steel clutch rings for vertical turret lathes. Carbide tools reduce cutting time 30 min. per ring. Speed 230 ft. per min; feed, 0.018 in; and cut, $\frac{3}{8}$ -in. rough and 0.050 in. finish.

• • •

substantial saving. In addition to this, our stock problem would be greatly simplified and our tool investment held to a reasonable figure.

Problem No. 2 was to find out what tools were adaptable to general-purpose use—obviously of importance if tool investment and tool stock were to be held to practical limits for our varied production. A review of our operations showed that about four sizes and six styles of tools could be used on a large number of applications.

Management Control an Important Problem

Problem No. 3 was a management problem, the most important of the three. We felt that the success of our experiment depended upon an efficient

system of management control to carry out several important functions.

First step taken was to see that all executives, supervisors and others who would be concerned with the program thoroughly understood the procedure and objectives, and further, that they were as nearly as possible "sold" on the value of the program. It is obvious that this was of particular importance, as complete cooperation of all management factors would be vital to the success of this program.

Provisions were then made for a system of control to provide for the selection of suitable carbide applications, use of correct tool design, and the proper adjustment of speeds and feeds for economical carbide tool use. While the chief duties of those se-

lected for these functions were of a technical nature, their task also involved a certain amount of promotional work to encourage the use of carbide tools on as many applications as possible. It was necessary that the man or men responsible for this activity be "self-starters," constantly on the lookout for carbide applications on each day's work, and alive at all times to the possibilities of carbide tool use. In other words, the mere placing of carbide tools in stock does not insure their use. They must be actively "pushed" within the organization.

The management problem also involved a careful review of our facilities for grinding carbide tools. With the increased use anticipated, it was our feeling that perhaps our existing facilities and methods might be inadequate for the additional load. As a result of this, we added two new pedestal grinders, one for use with silicon carbide wheels and one for sharpening with diamond wheels. We also sent a man to the Carboloy plant to become familiar with the latest rapid, grinding technique for Carboloy tools. Based upon our experience with Carboloy tool use, we felt that correct grinding procedure is not only vital to successful carbide tool usage but also pays substantial dividends in increased tool life.

Wages of Operators Adjusted

Another management problem in connection with this broad-scale tooling program was the question as to whether operators' wages should be adjusted to compensate in part for the increased production obtained with carbide. We decided upon a rather unique plan and it has worked to the advantage of both the operator and the company. The procedure inaugurated was to compensate the operator for the entire time he saved on his first job with carbide tools. On subsequent jobs the normal rate was adjusted upward to a satisfactory figure.

We believe this procedure has paid dividends. Our operators have always been very cooperative but under this new plan their customary cooperation has been even greater. They were eager to try carbide tools on new jobs—and to make it perform in the best possible way.

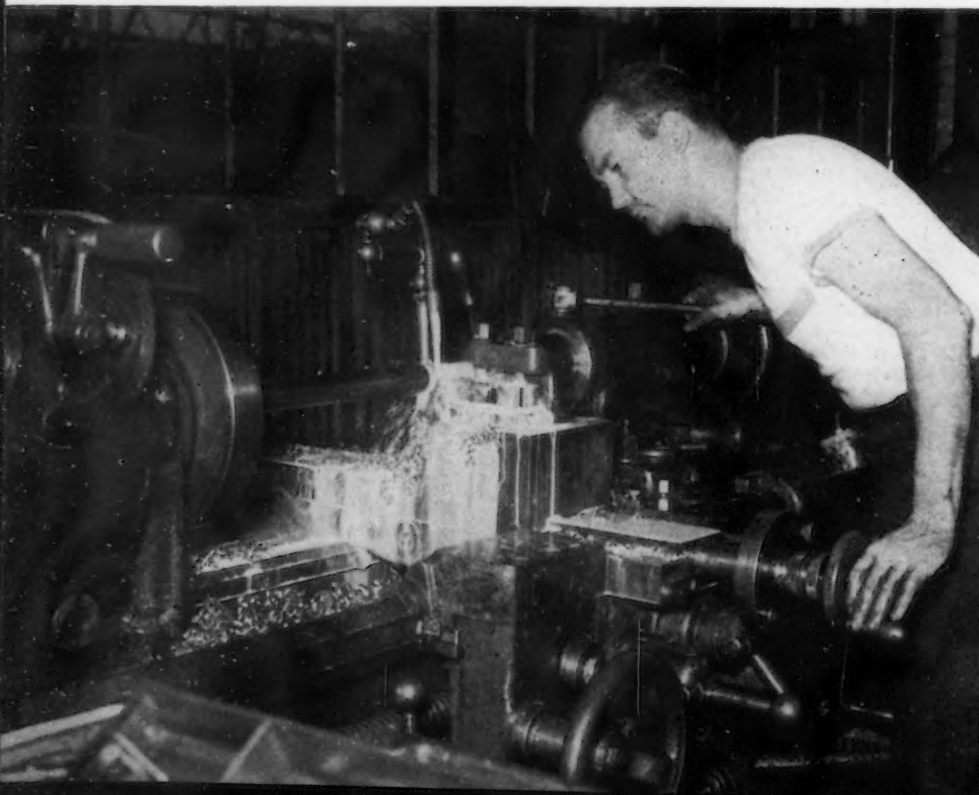
Results of Carbide Tooling Program

You will recall that the objectives of this broad tooling program was to show that carbide tools could be used profitably on small-lot, job shop work, and to formulate a practical plan for such use in our plants and in the plants of users of Bullard vertical turret

(CONCLUDED ON PAGE 42)

TURNING a steel shaft at 200 ft. per min. The feed is 0.018 in. and the cut, 1/16 and 3/16 in. Lot quantity is 55 pieces.

• • •



40 CARS

REplete WITH

DIE CASTINGS

o o o

IMPORTANT advances in the use of die castings nearly of all which are in zinc alloy, were particularly noticeable in cars displayed at the recent New York automobile show. Of great significance from the standpoint of those who supply the base metals and alloys and who cast and plate them, is the extended application of die castings including radiator grilles by at least four of the six full-size cars selling in the lowest price brackets, for it is in this group that a large part of the total production is concentrated.

Grilles and Front

For the first time in its 1940 models, all Ford passenger cars will be equipped with die cast grilles in front of the radiator. Although the new Ford grilles involve two quite sizable major castings and two small center strips, the assembly for the DeLuxe model weighs less than 8 lb. This light weight results because good use is made of thin sections which, however, are quite stiff because of the angle-shaped section employed for grille

bars. Assembly, effected by screws, is a simple matter and the bright plating and sharp edges possible in a die casting result in a highly satisfactory appearance.

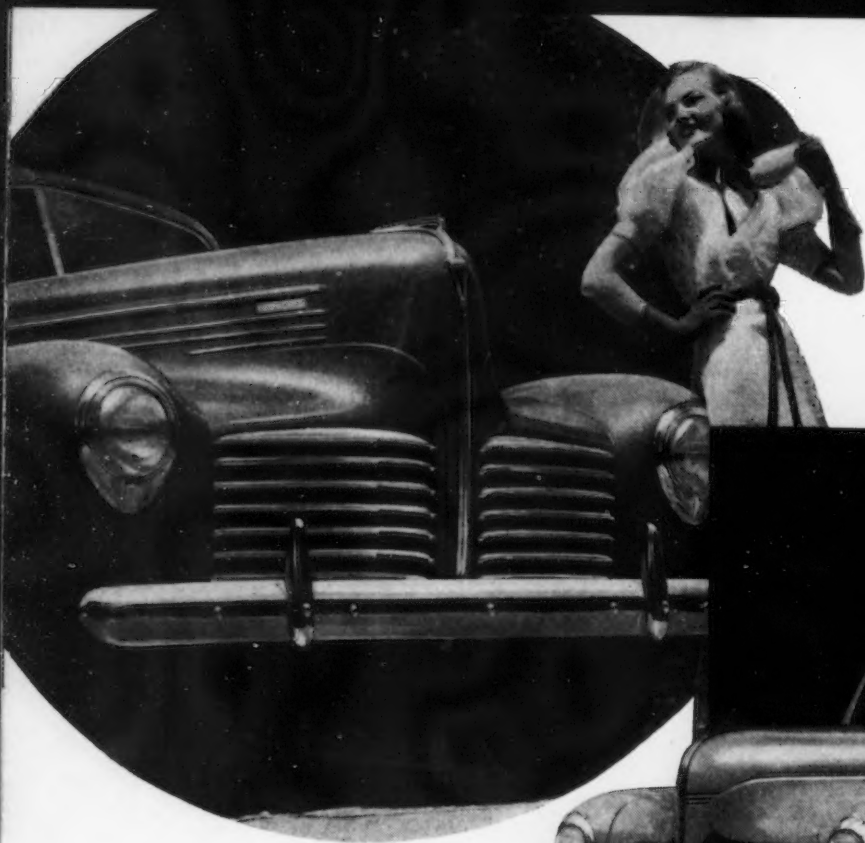
Studebaker Champion, which was equipped with a four-section die cast grill having two of its sections placed in fender aprons in the later 1939 models, continues the same general type in 1940 but with some minor changes in design. In both cases, however, thin channel sections have been used for grille bars so that total weight is reduced. Willys makes use of die cast fender grilles for the first time and also takes advantage of light channel sections.

For 1940, Hudson is employing the same die cast grille in all its models, including the one selling in the lowest price brackets. In this design, die cost has been minimized by adopting a grille built up from 14 sections all die cast in angle sections which are quite wide and spaced well apart. Six parts for the right half are duplicates as are six parts for the left half. The two remaining parts, one left and one right are placed at the top and are attached to the bonnet. This type of design results in more parts to handle and to assemble, but they presumably facilitate polishing and plating opera-

tions and, besides, lower die costs may thus result in economies not realized otherwise.

Plymouth and Chevrolet continue with stamped grilles, as in the past, and Dodge also has a stamped grille, as last year, although it used die cast grilles on some earlier models. All General Motors cars except Chevrolet have new designs of die cast grilles, as they did last year, and so do all Studebaker cars. Mercury has a die cast grille for the first time and Zephyr continues with the die cast type in an altered design. Nash continues with a narrow die cast radiator grille and also has its fender grilles (which were in sheet metal last year) die cast. Packard uses fender grilles for the first time and chose the die cast form. DeSoto continues with the die cast form.

Olds, which was the first car to employ a die cast radiator grille and has used one every year since, has a new and striking design. The major section, which includes five groups of narrow horizontal bars and extends onto the fender aprons, is in one piece. This unit for the "Six" is enameled (this and the Ford V-Eight being the first die cast grilles to be thus finished) but that for the Olds "Eight" is plated. On both Olds "Six" and "Eight,"



SIX of the 1940 models in which die cast grilles constitute prominent features of front end styling. Ford uses a die cast grille for the first time, that on the V-Eight, here shown, being enameled in body color. Olds, first to use a die cast grille, continues the practice for the sixth year. The latest design involves a large casting extending across the center and onto the fender aprons, this being enameled on the Six, here shown, and plated on the Eight. Wide grille bars are die cast separately and attached to the large casting made up of narrow bars. At each



there are five separately cast wide horizontal bars which are plated and subsequently assembled to the main section. This results in a sturdy and distinctive grille, though one which is heavier than on most cars.

Head Lamps

With more lamps than ever being recessed in fenders, there is a further increase in the use of die cast bezels. Here again die cost is low and the casting can be made with convenient supplementary parts such as mounting bosses and recesses for parking lights

and/or lights for signaling turns. Modern casting technique permits of remarkably thin sections. A great variety of other die cast parts such as hood moldings and ornaments, louvers, name plates and the like continue in favor, as in recent years.

Steering Column Assembly

Two other centers of interest, as far as die castings are concerned, are the assemblies at the upper ends of steering columns and those on the instrument panel. In the first of these groups, many mechanical parts are in-

volved but those which are exposed are again seized upon by the stylist who is recognizing die casting as a means of working in desirable styling features with little or no increase in cost. Several makes continue with steering wheels having flexible stainless steel spokes, but there is a considerable trend away from this type and toward rigid spokes some of which are made by die casting over steel rod inserts. Nash has a wheel of this type, the spokes being joined to a decorative hub forming a one-piece unit. Outer ends of the spokes are welded to the rim core and are covered with plastic when the rim is molded over the core.

Other die castings at the upper end of steering columns include the hubs of many wheels, some covers for hubs and for the inner ends of horn rings, several shifter levers and brackets for same, and some parts for controls involved in direction signals. There is a wider use of die cast horn rings or ring segments because these parts are conveniently die cast in one piece with

end of the grille, under headlamps, are other large die castings in which parking lights are recessed. DeSoto has a pair of radiator grille castings, with horizontal bars, extending partly over fender aprons. Willys uses a pair of die cast grilles for the first time and Studebaker continues, with minor changes, the two-piece die cast grille used in 1939 models. All new Hudson models have grilles with 14 widely spaced horizontal bars, all of which are cast separately.



changes in section and design details. Shifter levers are die cast in channel sections, as a rule and some include spherical bearing parts and convenient projections which are readily made in a die casting.

Instrument Panels

For instrument panel units, the die casting is employed much as in the past but to a wider extent, apparently because designers have become increasingly aware of the ease with which it can be adapted to odd shapes with integral mounting bosses, hinges, bezels and grille bars. Plastics are still used in combination with die castings, but chiefly for knobs or where a transparent material is needed.

Hardware

Hardware, both interior and exterior, continues to be die cast in a large percentage of new models but with minor changes in styling and some in location. Exterior handles, for example, are in some cases recessed



in belt moldings so that they appear to project less and give the impression, especially in side views, of being a part of the molding. This is in line with trends to do away with certain projecting parts, or to make them blend into the streamlined body.

A similar tendency is noted in rear fittings, including tail and license lamps. Some of these are more nearly flush with fender and body parts and are either die cast as portions of moldings or in such a way that there is a minimum disruption of flowing body lines.

As to strictly mechanical parts normally hidden from view, there are some additions to the die cast list, among them being oil pump parts, fuel strainer elements, electric windshield wiper parts, fittings for heating and ventilating installations and (on the new Crosley) a complete transmission case. Packard is continuing the die cast cover for its transmission and there are some new and hidden parts in gear shifting systems, vacuum top raising mechanism and the like. Of course, carburetor and fuel pump bodies, parts of vacuum windshield

ASSEMBLIES at the top of steering columns on the '40 cars include many die castings. Hudson, for example, has the steering wheel hub, inner portion of shifter lever, housing and bracket for direction signal and bracket surrounding the steering column die cast. Other die cast parts seen in this view include interior door and window hardware, instrument bezel, and radio grille.

• • •

wipers and a variety of fittings, including some for window regulators and for convertible bodies, continue in die cast form. More horns are being die cast for 1940.

Although returns are not yet all in, it is probable that the average weight of individual die castings for 1940 cars has been decreased to some extent, partly through the use of the lighter sections which can be cast with modern machines.



Carbide Tools Economical On Small-Lot Work

(CONCLUDED FROM PAGE 38)

lathes and other general purpose equipment. The basis of this plan was to select two general-purpose carbide grades, an absolute minimum of general-purpose tool sizes and shapes. These factors plus the management control factors just outlined constitute the essence of the complete plan.

The plan has worked amazingly well. We are using carbide tools widely not only on cast iron and non-ferrous metals but also extensively for steel cutting. This latter is perhaps the most enlightening feature of the entire program. In common with many others, we had always felt that the use of carbides on steel was something to be avoided, but today we are machining a large number of steel parts with no more ado than on the "safer" cast iron and non-ferrous parts.

Table I shows the savings obtained with carbide tools on 22 of the steel cutting jobs tooling up early in this program. It will be noted that the savings in some cases are small, in other cases quite substantial, but that this total overall savings are exceedingly worthwhile. These initial applications more than paid for the cost of the carbide tools and left a substantial

margin. This before the tools had had any appreciable wear!

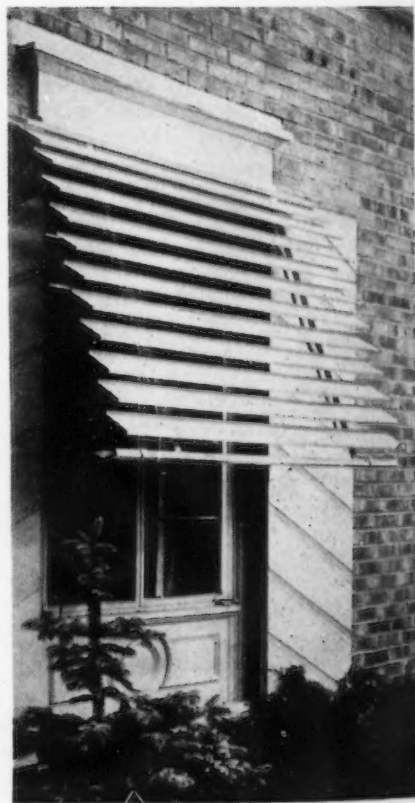
As to general saving in time throughout the shop on machining steel cast iron and non-ferrous metals, I believe that an extremely conservative average would be 33 1/3 per cent of previous time required with high-speed steel tools. And it should be emphasized again that these savings have been made not on large quantity production work but on diversified applications with quantities ranging from 6 to 200.

This unusual experience with carbide tools has literally "opened our eyes" to the very worthwhile savings available to the small-run, diversified lot shop, and it led, indirectly at least, to the development of a new vertical turret lathe capable of utilizing carbide tools to much greater advantage.

BUSINESS volume of United Engineering & Foundry Co. has increased approximately 25 per cent as compared with the pre-war period prior to September, K. C. Gardner, vice-president of the company, said. The heavier buying movement has continued in both the machinery and rolls divisions of the company, he said, adding that the rolls volume has tended to keep pace with the increase in operations of the steel industry.

Awnings Made of Steel

A NEW product of steel is a Venetian awning, made by the F. C. Russell Co., Cleveland, of Armco's galvanized "Paint-grip" sheets. Advantages are said to be all year-round protection, visibility, ventilation and light control



Job-Lot Aircraft

STAMPINGS

By FRANK J. OLIVER

Associate Editor, *The Iron Age*

IN the second and concluding part of the article, which began in last week's issue, the author describes how the use of rubber pads in conjunction with simple dies of wood and metal has made the large size hydraulic press one of the most useful tools in the manufacture of aluminum alloy sheet metal parts for all-metal planes in small lots.

SINGLE, double, and triple action presses of large size are being used in the aircraft industry for the production of thousands of shapes and sizes of sheet metal parts made of aluminum and its alloys, particularly duralumin. The double and triple action presses are used for deep drawing work in the conventional manner which need not be described here. Inexpensive wood dies are being used, however. Of chief interest at present is the multiple blanking, cutting and forming work done on single action presses employing a thick rubber pad for the punch on the upper or moving platen of the machine and low cost dies made of wood, composition material and simple metal forms placed at random on the stationary bed. This process is limited so far to aluminum

alloy parts and has not been applied to stainless steel.

Forming by this method is not new. The process was covered by a patent (No. 124,669) issued in 1872 to A. Delkescamp of Brooklyn. Cutting and blanking is a much newer technique and the essential process is covered by patent No. 2,055,077 issued Sept. 22, 1936, to Henry A. Guerin of Los Angeles and assigned to the Douglas Aircraft Co., Inc. The chief distinction between the two is that the Guerin process provides that the rubber pad be constrained at the edges by placing it within a metal container with a peripheral wall on all four sides, resulting in a different kind of cutting or shearing action than when the pad is not so constrained. It is on this point that the validity of the

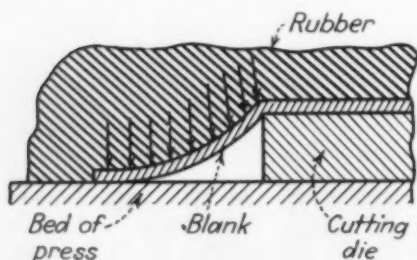
patent rests. Obviously, however, both cutting and forming may be performed with a constrained pad.

Blanking Operations

For cutting or blanking work, flat, boiler plate dies are cut to the outline of the required blank or blanks. In fact, on a 5000-ton H-P-M hydraulic press installed at the Douglas plant, having a bed measuring 65x186 in. at the ends and 96x72 in. at the sides, as many as 65 blanks have been cut at one pressing. In general practice, these dies are $\frac{1}{4}$ to $\frac{1}{2}$ in. thick and usually have a 6-deg. undercut at the cutting edges. Where the runs are long enough to warrant it, sometimes the dies are cyanide hardened and disk ground to lengthen their useful life.

The cutting blocks or dies are simply laid upon the upper face of the table, no attempt being made to fasten them down. Locating pins project from the upper faces to locate the blanks which have corresponding locating holes punched by hand in a simple jig. Blanks are of such size that the flange area extending over the periphery of the cutting edges is sufficient to engage with the table when

the material is bent downward in the initial stages of the work. Compression of the rubbery material of the pad causes tension in the unsupported portion of the sheet and a concentration of forces at the cutting edges, resulting in a cutting action at this



IN blanking by the Guerin process, it is necessary that the sheet extend beyond the cutting die a sufficient distance so as to contact the bed of the press in order to build up tension in the unsupported area. The fluid pressure of the upper rubber pad causes stress concentration to take place in the plane of the cutting edge. At present this technique is limited to aluminum and duralumin parts.

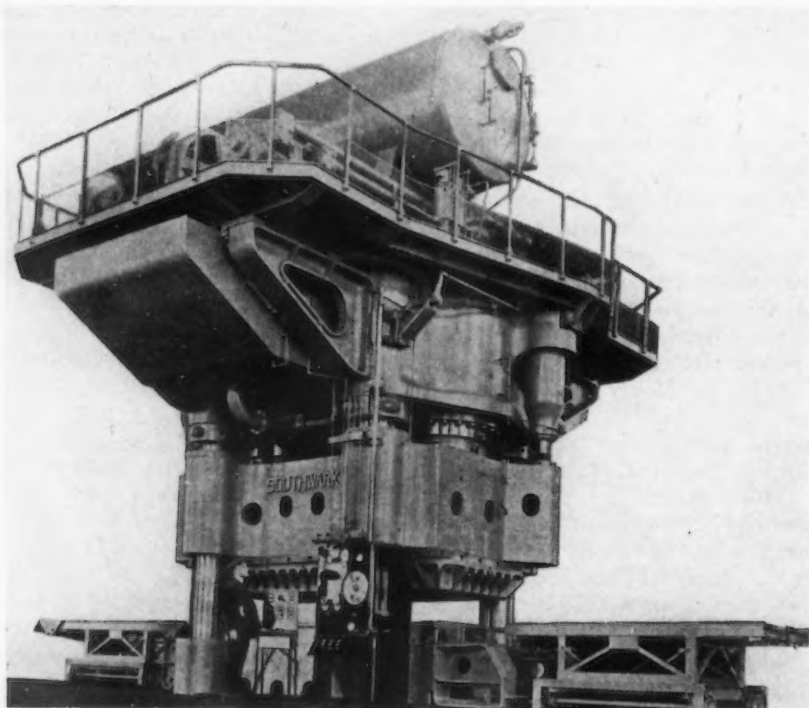
point. When this occurs, the scrap or excess metal is forced downwardly against the face of the table and the sheet metal blank remains on the upper face of the die. The total action is practically instantaneous. Interior or lightening holes of any shape or size

are similarly cut out simultaneously. The rubber pad acts as its own stripper when the pressure is relieved.

As can be seen, the bottle neck of the operation is the location of the dies on the bed and the laying of the sheet metal blanks thereon. To overcome this drawback, presses have been built with two to four separate bolster plates. When not in use, these plates are carried on roller conveyor tables mounted on wheeled buggies, running on tracks, so that after the dies are placed, the loaded plate may be slid into the press. This same rapid loading technique may also be used as a means of speeding up the operation of removing finished work from the various dies and substituting new blanks.

Forming operations are not much different from those described above, except that unrestrained rubber pads can be used and much lighter pressures are needed. Draws up to 7 in. have been accomplished in this way over simple wood or metal dies. Either male or female dies may be employed. Dies are made from wood, Masonite (a hard tempered material made of exploded wood fiber), lead, zinc or dural, melted from scrapings. Masonite can be readily worked with ordinary wood-working tools. On very limited quantities, up to say five pieces, a special plaster known as Certrock

DESIGNED for use with the Guerin process, this huge 5500-ton Southwark hydraulic press carries on the moving platen a steel casting containing a rubber pad 157 x 57 in. and 12 in. thick. This pad performs forming and blanking operations over simple dies made of plate steel, Masonite and even plaster. This particular machine, which was shipped abroad, also exemplifies the use of multiple lower platens and transfer buggies to speed up loading of blanks and stripping of completed work off the dies.



has been used successfully. The rubber is a black vulcanized variety with a durometer reading of about 55. It may be had in pads from 2 to 12 in. thick. To localize the force over certain dies, additional rubber mats are placed over the dies themselves. The rubber is under a pressure of over 1000 lb. per sq. in., or higher at local points, and in this condition acts as a fluid, flowing into and around any



IN the rubber punch method of shallow draw or with flanges simply laid on the bed of the ment. Any make of single acting this

object with which it may come into contact.

Advantages and Limitations

The rubber pad method of producing multiple stampings on hydraulic presses of large size (and hence carrying high machine-hour burden) establishes itself economically for small-lot production on these counts: It enables a large number of pieces of different size and shape to be blanked or formed at one time, thereby multiplying the output of the press per

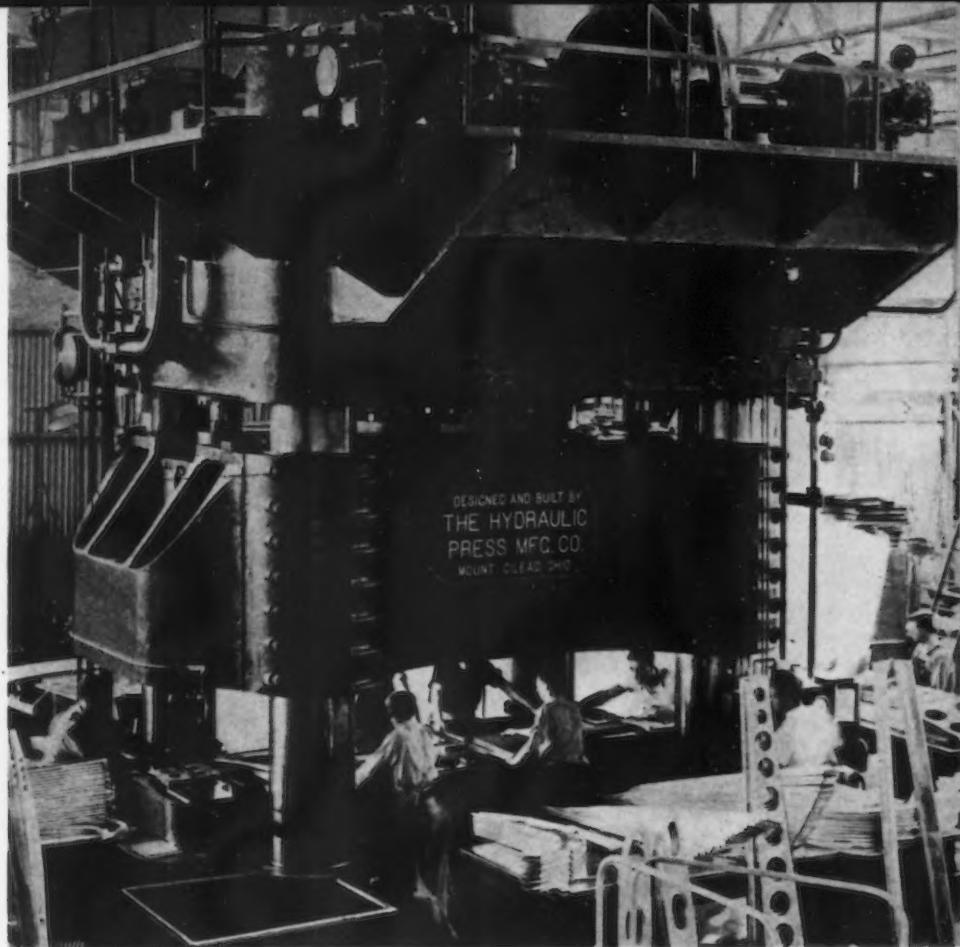
stroke and raising the hourly productivity; it reduces the die setup time to a fraction of a minute per die; it cuts die costs tremendously by eliminating one half of the die and the work of precisely matching it to a companion die; also because of the resilience of rubber and absence of shock, die costs are further cut through the use of low strength, readily worked materials like wood, and even plaster in limited



Blanking and forming parts of the cutting or forming dies are press in any convenient arrangement. Hydraulic press can be used for work.

instances. Tool costs, in fact, have been reduced to as much as 1/25th conventional die costs.

The limitation of the process is that insufficient unit pressures are developed to deform tough, springy material like stainless steel, but this problem may yet be overcome. In practice at present the process is restricted to work on soft aluminum alloy stock of a maximum thickness of 0.094 in., although long narrow pieces up to 0.125 in. gage have been formed. Also, as in the case of deep drawing opera-



FOLLOWING the development of the Guerin process for cutting duralumin blanks, the Douglas Aircraft Co., Inc., installed this huge 5000-ton H-P-M Fastraverse press, which has a platen 186 in. long and 72 in. wide at the central portion. On this press a large number of parts may be blanked or formed over simple dies at one stroke, using a rubber pad 9 in. thick confined in an upper die 10 in. deep. Dural parts have been drawn up to a depth of 7 in. on this press, besides being cut and flanged.

tions using conventional dies and hold-down rings, the metal is thinned out in some areas, where the reverse is true in ordinary drop hammer work, an important point in stressed skin construction.

It is evident from the above analysis that there are distinct fields of application for both drop hammers (discussed in detail in the first part of this article) and hydraulic presses, as well as the punch press for high production runs on parts common to many designs. It is also true that at present, the latitude of work possible on the hammer exceeds that of the press.

There are several other methods of metal forming that will be discussed briefly. One of them is metal spinning, which will be mentioned only in passing. (For a complete description of the technique see p. 30 of the Aug. 24 issue of *THE IRON AGE*.) Another is the long forgotten process of stretching.

Stretching and Shrinking Machines

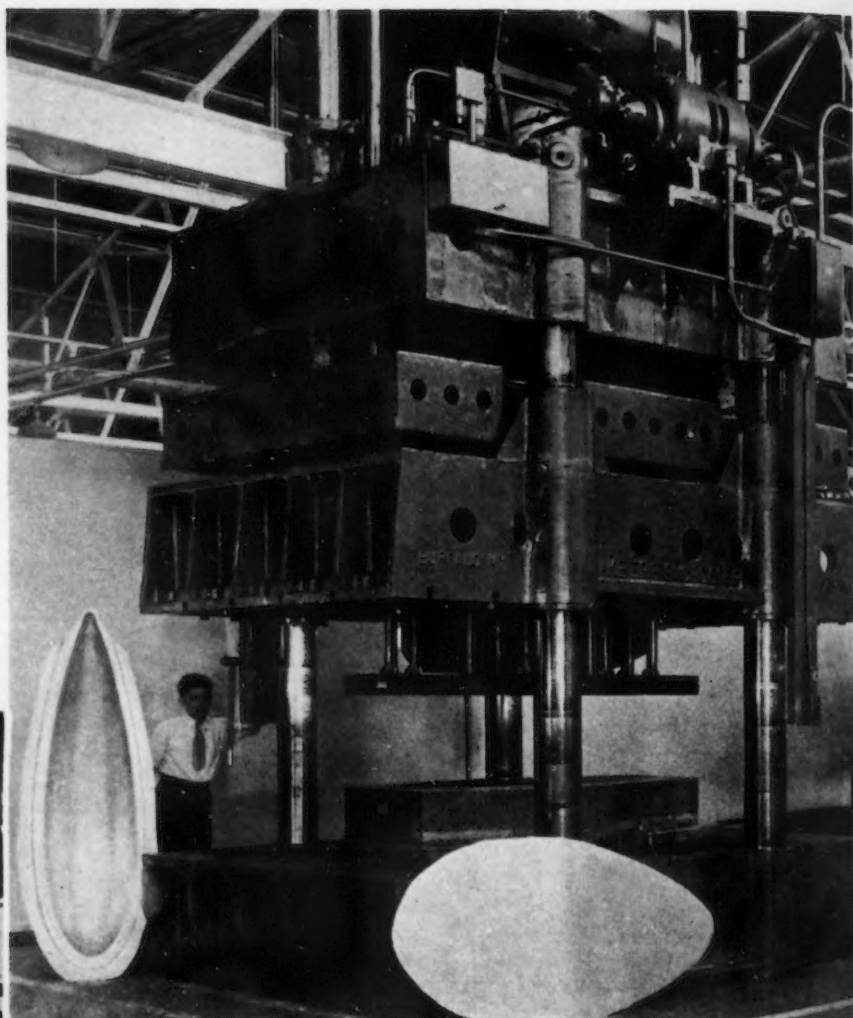
Once so common in the automobile body plants 25 to 35 years ago, the

stretching machine survives today only in a few custom body plants. In the last year, however, a hydraulic stretching machine of modern design has appeared on the market and a few of these machines have been sold abroad to European aircraft builders. Germany has been using machines of this type in the last three or four years. Essentially the machine has sets of pneumatic hold-down clamps for constraining the sheet at either end, and the male die or dies are elevated on hydraulic tables from below. The metal is stretched at the point or area corresponding to the deepest draw and is necessarily thinned at these areas, while the unstressed parts of the sheet retain the original gage. Hence, this process is limited to simple shapes of non-stressed parts, such as cowlings, rings, and is comparatively slow, the greatest amount of time being consumed in locating the sheet over the die and clamping the ends. Production time per piece is between 5 and 10 min. As in the example of the hydraulic press, however, simple wood and plaster dies of low cost are used.

The same machinery builder (Engineering and Research Corp.) has also

developed two other sheet metal forming machines for particular use in the aircraft industry. The Erco sheet metal shrinker is designed to reduce the length of metal in a localized area. Two pairs of identical interlocking jaws are used, the upper being attached to a reciprocating ram, the lower to a fixed post. The jaws are two wedge-shaped pieces resting on inclined anvils and held apart by springs. The working surfaces are roughened to aid in gripping the sheet. Stroke of the ram is so adjusted that after the work is gripped at two points, the ram forces the jaws to slide down the inclined surfaces of the anvils, thereby compressing the work, reducing the length and increasing the thickness. The working surfaces of the jaws remain parallel during the operation.

Gathering and thickening locally may also be performed on a standard

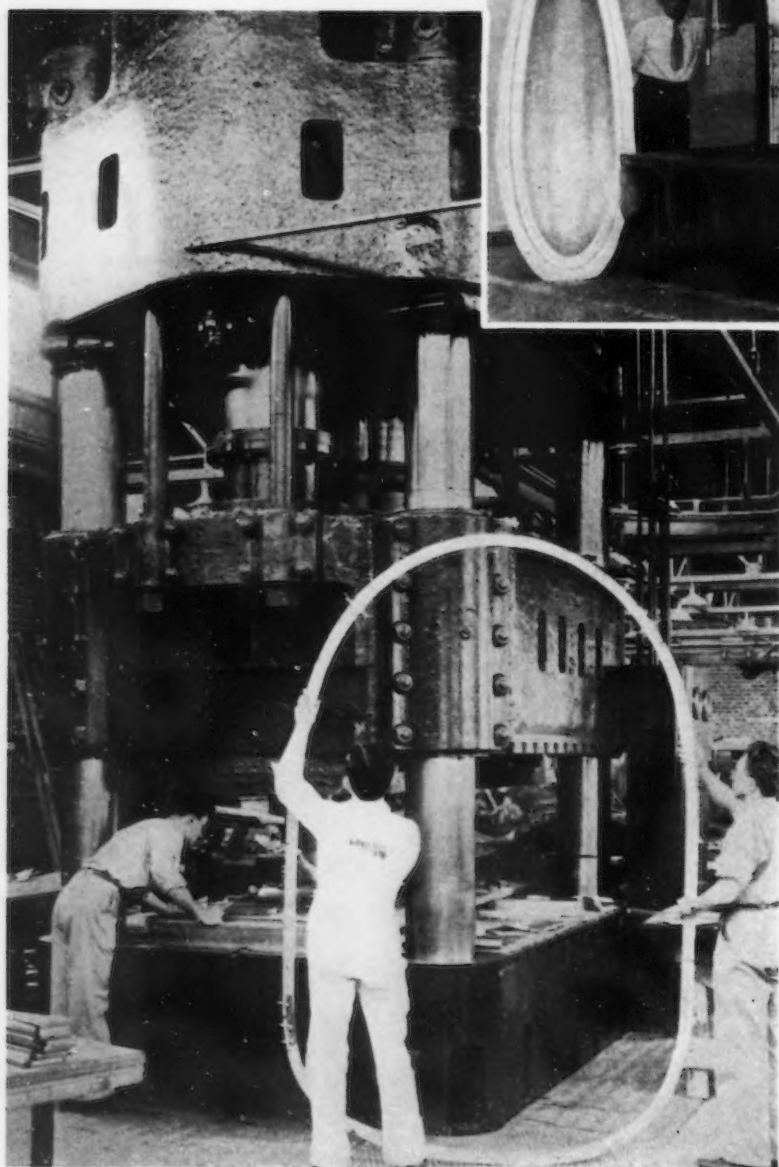


ABOVE

INEXPENSIVE wood dies are also being used for deep drawing work by means of the conventional method in double acting presses. This is a 600-150-ton Lake Erie double action, self-contained hydraulic press shown producing half of a pontoon shell. Punch, draw ring and lower die are all made up of laminated wood sections glued together and faced with metal strips.

AT LEFT

BLANKING and forming of aircraft parts are being performed on this Farrel 2000-ton hydraulic press, using rubber and simple plate dies. The bulkhead ring held by the men in the foreground is assembled from sections formed in this press.

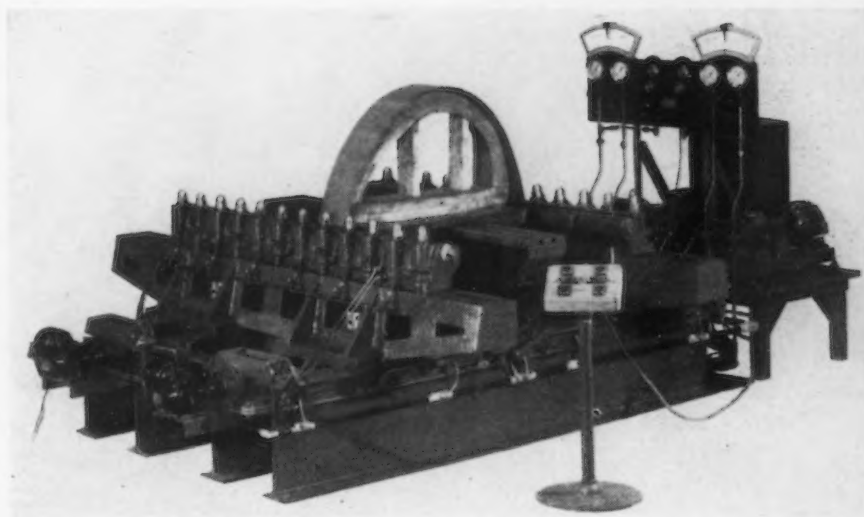


high-speed percussion hammer, using a male die with tapered tongue and corresponding groove in the anvil, although primarily this type of power hammer forms by thinning the sheet and expanding the area.

Another Erco product for short run and experimental work in the aircraft industry is a sheet metal former which performs difficult flanging and forming operations previously limited to hand

production. With this small machine it is also possible to reproduce flanged work done on hydraulic presses with rubber pads. It operates on the same principle as a bending brake, except that the tool is less than an inch wide and therefore bends over only a small section of the sheet at each stroke. In effect, the action is like bending over the edge of a sheet progressively with a pair of pliers. A hold-down tool performs the triple function of gripping the work on the anvil during the working stroke of the brake tool, of furnishing the form against which the flange is finished and of providing a guide for the work. The standard hold-down tools have a finger-like extension as a guide against which the edge of the work is lightly pressed in order to obtain the desired flange height. The brake head oscillates in tracks in the frame through an angle adjustable up to 100 deg. Obviously the blank contour must be accurately prepared before flanging work is started. Smooth and well-formed edges are produced by bringing up a small part of the sheet at each stroke. Small radii and complicated shapes can be formed without wrinkling of the flange. Any material may be handled.

In closing, attention is called again to the fact that the techniques dis-



WORK done in a hydraulic stretching press is similar to that performed in a double acting press, but in reverse. Since the sheet is constrained by the air operated hold-down clamps only at the ends (instead of all around, as with a draw ring), the process is limited to rather simple forms, such as the wheel guard shown.

cussed above and the machines on which they are performed are for job-lot work. For repetitive work on small parts that are common to many plane models, there are many straight side and inclinable back presses being used in the industry. Aircraft design and hence manufacturing are in a state of flux, but should a national emergency necessitate standardization

of a few proved designs, we might expect a gradual change in methods for producing sheet metal parts. The quantities involved, however, will hardly approach automotive body production levels, so that the question of die costs will continue to be the governing factor, and will thereby limit the techniques employed largely to those discussed in this article.

WRINKLE FINISH FOR CASTINGS

NEW WRINKLE, INC., Dayton, Ohio, has recently developed what is known as the New Wrinkle dip-process of castings finishing.

The dip-process of castings finishing is made up of three simple steps.

First—The casting is dipped in a thin solution of Wrinkle Finish. This dipping process is said to insure complete coverage for all exposed-to-the-eye surfaces, and also securely seals all the pores on hidden surfaces where rust-proofing is the only duty a finish serves.

Second—The casting is placed on a slightly inclined, removable screen-

covered rack so the surplus paint is collected in a tray which returns it to the dipping tank. By racking the castings in this manner and letting them stand for several minutes, the finish is given an opportunity to set.

Third—The casting is now ready for a quick spraying accomplished with a minimum of waste as the atomized material readily adheres to the wet casting surface.

During the baking operation which follows, New Wrinkle effects the change which has made it one of the most popular finishes today. It provides both an attractive appearance and a hard surface that cannot be marred very easily. Its effect ranges

from the small "fish-eye" wrinkle of fine texture to the "pine tree" wrinkle dependent upon the desire of the user. The finish hides any surface flaws in the casting and by so doing does away with the need for ultra-finished castings at the foundry.

It is stated that a prominent manufacturer of water heaters located in Ohio, prior to using the New Wrinkle dip process, finished the doors for these heaters by the dry spray method. Production under this method was 100 pieces per hr. with 20 per cent rejects. The claim is that since using the New Wrinkle dip process, production on the same pieces has increased to 200 per hr. with no rejects.

THIS WEEK

ON THE

ASSEMBLY LINE

By W. F. SHERMAN
Detroit Editor

*... Strike at Dodge plant continues to tie up Chrysler ...
Total production eases off to 74,114 because of strike ...
Hayes Body makes plans for military production under new president ... Divco contracts to furnish bodies to GM for delivery trucks.*

DETROIT—While labor warfare continued to affect production output of the automobile industry, some of the first definite effects were felt by the industry from the war in Europe. Indications that the export market for American automobiles and trucks would be affected by the war are thus coming a few steps nearer to realization.

The Chrysler production tie-up was marked during the last week by the beginning of a formal strike at the Dodge plant after five days required by state law had passed. At the same

time the new State Labor Mediation Board injected itself into the conferences which have been going on between Chrysler and the UAW-CIO.

"Rights of the general public" were emphasized as Arthur E. Raab, State board chairman, and A. C. Lappin, member, asked the disputants to a board hearing at Lansing, the state capital. Although both corporation officials and union leaders appeared for the Lansing conferences without being subpoenaed, Chrysler officially protested that it had not asked and was not accepting State mediation. After

the sessions at Lansing, private conferences between Chrysler and the UAW were resumed in Detroit but with the labor board members sitting in as observers.

No Settlement in Sight

Considerable progress has been made in the direction of better understanding of the issues involved by Chrysler's adherence to the policy of forcing the issues into public discussion, but it would be premature to say that negotiators are any closer to a settlement of the union demands which have caused the strike. When Chrysler made conciliatory gestures on the subject of production rates the union backed away and left the closed shop issue as the outstanding one. It is easy for other management officials to see that this is not a point readily submitted to a mediator and to understand why Chrysler has been so emphatic in telling the State mediators that the dispute would not be turned over to them.

It may be that an important point of policy of this nature is not subject to arbitration or compromise. The answer must be either "yes" or "no"; it is not like a matter of hours or wages or conditions of labor—you can split a nickel or an hour but not a principle.

The company's stand on the question of production rates was clarified with an offer to go as far as any other auto manufacturer has in studying and revising production rates. A proposed clause stipulated that the management agreed to make studies on the basis of fairness and equity before it established rates of production. Then if any employee or group claimed that the rate on their job was too fast and if the foreman was unable to adjust the matter, the job would be examined again and adjustments made. The union objected that this type of clause, put in a General Motors Corp. agreement in 1937, has been modified considerably in practice in G.M. plants.

"We have had joint time studies in

Automobile Industry During Year Ended September, 1939

| PRODUCTION AND VALUE | |
|---|-----------------|
| Car and truck factory sales, U. S. and Canada | 3,587,000 |
| Passenger cars | 2,892,000 |
| Motor trucks | 695,000 |
| Percentage increase over 1938, motor vehicles | 33% |
| Wholesale value of cars, U. S. and Canada | \$1,776,151,000 |
| Wholesale value of trucks, U. S. and Canada | \$448,324,000 |
| Wholesale value of cars and trucks combined | \$2,224,475,000 |
| Wholesale value of parts, accessories and tires for replacement, and service equipment | \$1,243,236,000 |
| Motor vehicles, accessories, service equipment and replacement of parts and tires | \$3,467,711,000 |
| REGISTRATION | |
| Motor vehicles registered in U. S. | 29,425,000 |
| Motor cars | 25,215,000 |
| Motor trucks | 4,210,000 |
| World registration of motor vehicles | 43,000,000 |
| Per cent of world's automobiles in U. S. | 68% |
| EMPLOYMENT | |
| Employment in auto, auto body and parts factories | 380,000 |
| Weekly payroll | \$11,796,000 |
| MOTOR TRUCKS AND BUSES | |
| Motor trucks in use | 4,210,000 |
| Total special motor truck taxes | \$420,200,000 |
| Motor buses produced | 18,000 |
| Motor buses in use | 134,000 |
| FOREIGN SALES | |
| Number of American motor vehicles sold outside United States (U. S. exports and output in Canadian plants owned by U. S. firms) | 474,000 |
| Per cent of production sold outside U. S. | 13% |
| Value of motor vehicles, parts and tires exported from U. S. and Canada | \$312,100,000 |

3 HEADS 2 ARE BETTER THAN

And when to three heads are added rigidity, power, new anti-friction spindle design, making it possible to remove metal six times as fast as in the past—rapid power traverse on all heads in all directions—electrically operated stops that permit

size duplication to a half a thousandth or closer, and a dozen other cost and time-saving features—well, no wonder people are getting really excited about "Cut Master". Write us now for the circular illustrated below, and get the whole Cut Master story.

CUT MASTER



BULLARD

THE BULLARD COMPANY
BRIDGEPORT, CONNECTICUT

G.M. plants and results have been the basis for mutual agreement on the speed of operations," R. J. Thomas, union president, declared.

Observers believe that compromise is in the wind on this point.

However, the slow-down technique employed by the union got a thorough airing last week when W. J. O'Neill, president and general manager of Dodge, cited illustrations from the company's records.

"One of the first operations in building a car is what we call the assembly of the body-in-the-white," he explained. "This is accomplished in a battery of three major assembly fixtures over which the body passes in turn from one to another.

"How this operation in 1940 sedans compares with the operation in 1939 sedans is as follows:

"Number of men employed: In 1939—11; 1940—11. Comparison between the two years—the same.

"Clamps required to clamp the job for welding: In 1939—79; 1940—67. Comparison—15 per cent less in 1940.

"Welding guns required: In 1939—

16; 1940—14. Comparison—12½ per cent less in 1940.

"Spot welds to make: In 1939—699; 1940—642. Comparison—8.2 per cent less in 1940.

"Jobs per hour produced. In 1939—12; in 1940—8½. Comparison—29 per cent less in 1940.

Regarding cylinder block cores in the foundry, he continued: "This is one of the controlling factors in foundry operations, similar in importance to the body-in-the-white assembly in body building operations. How this operation on 1940 models compared with operations on 1939 models is as follows:

| 1939 | 1940 |
|-----------------------------|---------------|
| Material used | Same |
| Construction and size | Same |
| Operations involved | Same |
| Production per hour—70 | 70 down to 30 |

"The 1940 production decrease was as follows: Aug. 1 to Sept. 5—70; Sept. 5 to 12—55; Sept. 13 to 29—70; Oct. 2 to 6—55; Oct. 6 to 30—30."

Because of the Chrysler strike, output for the entire industry was off last

week to 74,114 units, compared with 75,860 in the previous week. In the corresponding period last year the industry produced 59,860 units, according to Ward's Automotive Reports. Chrysler plants had a volume of only 1695 units, compared with 10,025 in the previous week and 15,000 a year ago. Plymouth turned out only 240 automobiles, compared with 6900 in the previous week and 12,400, its peak, reached at the beginning of the month.

General Motors plants had a combined total of 39,839 units, which compared with 33,986 in the previous week. Chevrolet continued to climb, going to 22,000 total output, compared with 17,000 in the previous week.

Ford gained from 18,500 to 19,500 Fords and Mercurys. Lincoln-Zephyr was up from 400 to 450. Meanwhile, Ford's steel output is being pushed with as much energy as possible. Open hearth furnaces are reported to have poured nearly 2500 tons in one day last week. Ford furnaces total 10; one of these, rated at about 125 tons, is generally used for holding hot metal. Counting all 10, the rated capacity of the Ford open hearth line is about 1415 tons. It is expected that Ford will pour about 65,000 tons of steel this month. At the present rate the company-owned plant is producing something like 62½ per cent of its steel requirements, estimating a requirement of one ton of steel per car and not making any allowance for the operations between pouring ingots and rolling finished steel.

New Role for Hayes Body

Election of a new president by Hayes Body Corp. signifies an extension of that company's plans and activities in the direction of armament manufacture. John W. Young, newly named president, has been executive vice-president of Breeze Corporations, Inc., Newark, N. J., and president of Federal Laboratories, Inc., Pittsburgh. At the former he directed the manufacture of aircraft and military equipment and at the latter the manufacture of ordnance supplies. Mr. Young is technically trained as well as a business administrator. The Hayes company now is expected to desist perhaps, from trailer and other body work in favor of manufacturing aircraft equipment, munitions, marine products and armored bodies for trucks and tanks.

War Stimulates Truck Buying

Following announcement that the Federal Government has contracted for
(CONTINUED ON PAGE 66)

THE BULL OF THE WOODS

BY J. R. WILLIAMS





Hidden Profits

Bring EXTRA Dividends
to LIGHT Machinery Mfr.

THIS CARBOLOY-TIPPED CUTTER . .
(For Face Milling Sewing Machine Bed)

Saves
\$40.29
every 128 pieces

75% production increase—200% increase in pieces per grind—combined roughing and finishing operations—all these spell EXTRA PROFITS for this light machinery manufacturer. When you use CarboLOY tools you are in a position to get these savings plus other "hidden" profits in the form of savings from less downtime, less scrap, better finish, greater accuracy, lower tool cost per piece, and less tool grinding time.

These savings are not confined to quantity production jobs alone. Nor are they limited to new, modern machines. Whether your runs are large or small, your equipment new or old, you'll profit through these "Hidden Profits" when you use CarboLOY tools.

Write today for 24-page booklet of facts entitled "Hidden Profits In Your Machine Shop."

CARBOLOY COMPANY, INC.

11153 EAST 8-MILE STREET

DETROIT, MICHIGAN

CHICAGO • CLEVELAND • NEWARK • PITTSBURGH • PHILADELPHIA • WORCESTER, MASS.

Canadian Distributor: Canadian General Electric Co., Ltd., Toronto



Send for this unusual story of machine shop savings. Gives performance data on 30 typical jobs.



CARBOLOY CEMENTED CARBIDE TOOLS

THIS WEEK IN WASHINGTON

... New Deal advisers doubt war boom can eliminate relief rolls ... Washington told industry fears war's effect on nation's economic system ... Andrews replaced as Wage-Hour administrator ... U. S. asks bids on 12,000 motor vehicles for Army.

By L. W. MOFFETT
The Iron Age

WASHINGTON—That American industry fully realizes the dangers of war to its economic system has been made clear to Washington. Industry is emphatically sounding warnings of what might be expected if the United States should become involved in hostilities. Fear is widely expressed that war for the United States would threaten the capitalistic system. Government regimentation inevitably would be clamped down as a military necessity.

Considering the powerful forces in Washington that would like to see private enterprise wiped out, predictions are freely made that the upshot would be permanent Government control. But those who do not share this view agree universally that war profits would be mythical. Taxation, they have pointed out, would be so excessive as to practically confiscate profits.

"Peace" Collapse Is Feared

Even with the United States at peace, industry sees dangers from the sale of war materials to belligerent nations not only because profits will be subjected to heavy taxation, but that they also carry a threat to stable, peace-time trade. Of particular concern is the fear of over-expansion followed by a collapse when peace comes. On the other hand, it is recognized that there is always a chance that the United States may be forced into war and that in such an eventuality its industrial national defense would be fortified by added capacity.

It is known that the Government and manufacturers are taking steps to cushion the effects of such an over-expansion which the Administration in particular believes will result if the arms embargo is lifted. Some sources are of the opinion that war orders

from abroad will be so great as to vastly increase industrial capacity.

Buyers to Finance Expansion

Industry is painfully aware that it had to pay dearly for expanding facilities during the former World War, even though it was required to do so by the Government which did not remunerate manufacturers for the extra and heavy costs. The plan now under consideration seeks to obviate this problem. It is proposed that the costs for war expansion be paid by foreign buyers. Under the plan being con-

sidered this would be done by adding a 10 per cent increase on materials for foreign shipment over domestic prices.

There are those who doubt the soundness of the principle. It is pointed out that, first, it might set up strong public reaction against industry, despite Government approval, for capitalizing on war to make profits; and secondly, it would set up a twice-price system which many hold is impractical and economically unsound.

The dread of expansion is reflected in the case of a large shipbuilding plant which has been urged to expand. Despite "fair assurances" that it would net enough profits in "the next four or five years" to pay for the expansion—in this instance the 10 per cent differential in price was not in the picture—executives of the company resisted the suggestion. They had in mind their former World War experience when they expanded the plant and hired thousands of workers, ultimately employing 13,000 men.

In the slump that followed the war, payrolls dropped to 3000 men, the town was filled with unemployed men and the company had to set up a relief agency to care for 10,000 families who could neither buy food nor pay rent.

New Power Committee Seen As Setback for Col. Johnson

WASHINGTON—Like the decision to disband the War Resources Board, the White House order consolidating the National Defense Power Committee with the National Power Policy Committee is being interpreted as a setback for Assistant Secretary of War Johnson, as a further attempt to relegate national defense news to the background while Congress is debating the neutrality issue, and as an indication that the brain trust is more firmly entrenched than ever.

The National Defense Power Committee, named in September, 1938, by President Roosevelt to study electric power from the standpoint of national defense, has been conducting its affairs largely under the direction of Col. Johnson and it is understood that representatives of the utilities on the committee have been pleased with his work. The Assistant Secretary of

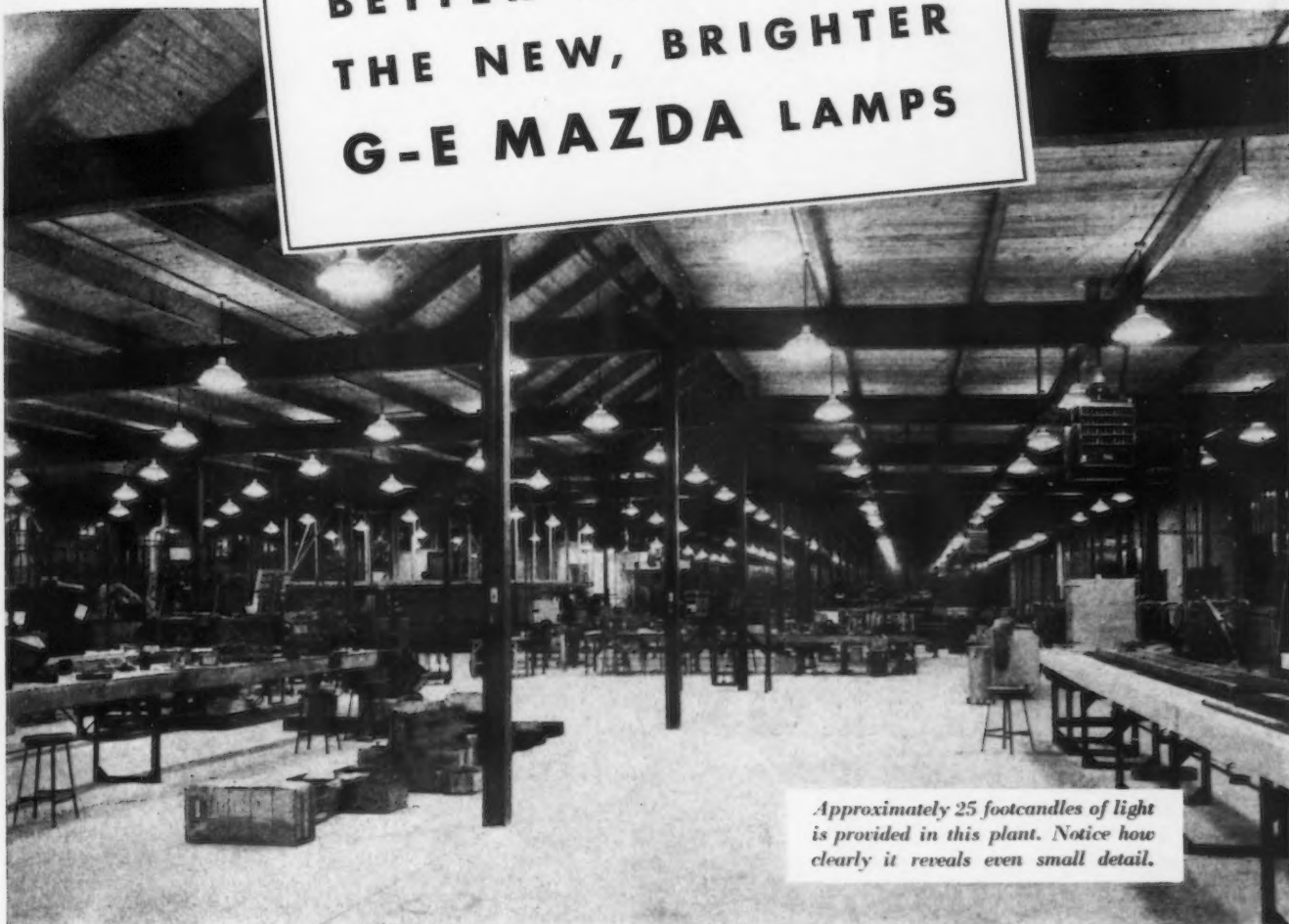
War continues as a member of the committee but Interior Secretary Ickes has been designated chairman.

Cohen on Committee

The National Power Policy Committee, of which Benjamin V. Cohen, of the New Deal team of Corcoran and Cohen, is general counsel, was named in the early days of the Roosevelt Administration to define the Government power policy but to date has never arrived at any definite policy. Since its inception, it has been under the direction of Mr. Ickes.

The new committee will devote itself, according to a White House announcement, to "the development of a national power policy in the interest of national defense as well as peace-time needs. It shall consider power problems common to the several departments and agencies represented on the committee, with a view to the

BETTER LIGHT WITH THE NEW, BRIGHTER G-E MAZDA LAMPS



Approximately 25 footcandles of light is provided in this plant. Notice how clearly it reveals even small detail.

Acme Electric & Mfg. Co. plant is Light-Conditioned

THE Acme Electric and Manufacturing Company's Cuba, New York plant is a good example of a light-conditioned factory . . . where there is the right amount of light and the right kind of lighting for easy seeing. This plant manufactures electric transformers . . . work involving close, accurate seeing that requires adequate light.

Good light is provided by 500 watt G-E MAZDA lamps in Glassteel diffusers mounted 13 feet above the floor and spaced on 11' x 13' centers.

Proper illumination for doing accurate work is a necessity in every factory. It helps everyone see more easily, work with less fatigue, and do a more efficient job.

Like many other industrial plants, the

Acme Electric and Manufacturing Company uses the new, brighter G-E MAZDA lamps because they stay brighter longer, and so give more light for the current consumed.

Send today for a free copy of "Lighting for Production in the Factory." Write to General Electric Co., Dept. 166-IA-J, Nela Park, Cleveland, Ohio.



USE A G-E LIGHT METER TO CHECK YOUR LIGHTING

Light Sensitive Cell

With a G-E Light Meter you can measure lighting in your plant and see whether it meets modern seeing standards. It costs only \$11.50.



G-E MAZDA LAMPS

GENERAL  ELECTRIC

coordinated development of a consistent Federal power policy."

Although Mr. Roosevelt said the Johnson committee had completed the major part of its work in estimating the probable power needs of the country, it is understood that a general committee of experts representing 12 geographical regions east of the Mississippi recently was appointed by the utilities to study war-time needs for plant expansions and transmission line interconnections. In addition, several sub-committees were organized to survey the requirements of individual companies within the 12 areas covered by the program.

Records and questionnaires of the Johnson committee have been in the hands of War Department and Federal Power Commission officials for several weeks. One of the points which had been under study was the electric power requirements of the railroads.

The Johnson committee will be remembered because of its announcement in October, 1938, that the Government had received definite commitments on the part of leading utility companies in strategic war material

centers to place immediate orders for plant equipment representing 1,000,000 kw. of generating capacity. Since that time, the committee has remained largely under cover and War Department officials have declined to comment on any phase of its work.

Superficially, the expansion program announcement appeared of some significance, because only 12 months previously the utilities were critical of the Government's "punitive" policy, protesting that the New Deal was largely responsible for the industry's lag in construction activities which it estimated at \$2,600,000,000. Actually, however, the commitments went little if any beyond the expenditures planned by utilities irrespective of the national defense angle. Nevertheless, the commitments for additional generating capacities of 1,000,000 kw. could not be ignored. The total electric generating capacity for this year is estimated to have increased by 1,200,000 kw. over 1938.

Some estimates are that the industry may spend as much as \$600,000,000 for new construction in 1940. This would be the largest expenditure since 1930.

Whether available industrial power is adequate for war-time demand presumably is a question which the new Federal power agency will attempt to answer. The utilities insist that sufficient generating capacity is on hand to carry a war-time industrial load. Some experts in the Government, however, take the view that while the power industry may appear capable on a statistical basis of supplying full peak war-time load, in order to do so that load must be well distributed geographically and spread out as to time. This school of thought has expressed doubt that each individual company is fully prepared or that all generating and transmission equipment is capable of carrying a full-time full-capacity load.

It is the opinion of most power experts that new legislation for war-time regulation of the power industry is not necessary in view of the existing powers vested in the Federal Power Commission and in the Securities and Exchange Commission under the Holding Company Act.


Germany Leads in Diesel Engine Exports

WASHINGTON — The Machinery Division of the Department of Commerce reports that, according to official German foreign trade figures, exports of diesel engines from that country in 1938 were valued at \$15,131,390. This foreign sales volume placed Germany well ahead of its principal competitors in the trade, principally the United Kingdom, the United States, Sweden, Switzerland, Denmark, Norway and France. British exports of diesel engines in 1938 probably totaled approximately \$10,000,000, while shipments, from the United States were reported at \$3,098,000.


Army Places \$833,880 Plane Engine Order

WASHINGTON—A \$833,880 order for aircraft engines has been placed by the War Department with the Aviation Mfg. Corp., Lycoming Division, Williamsport, Pa. The number of engines involved was not disclosed but a War Department statement broke the total amount down by engine types, explaining that Model R 680-9 engines, costing \$340,500, will be installed in Stinson O-49 aircraft; and that R 680-11 engines, costing \$493,380, are for installation in Stearman type PT-138 planes.

The Bill for Interruptions in Performance comes high



Accurate Springs keep things running smoothly



B-G-R
SPRINGS
SMALL STAMPINGS
WIRE FORMS

An ability to solve knotty spring difficulties... to get customers out of holes... has gained B-G-R the confidence of many spring users. B-G-R helps you to design the *right* spring... and the combined resources of two complete plants see to it that *your* schedules are maintained.



BARNES-GIBSON-RAYMOND

DETROIT PLANT
DETROIT, MICHIGAN

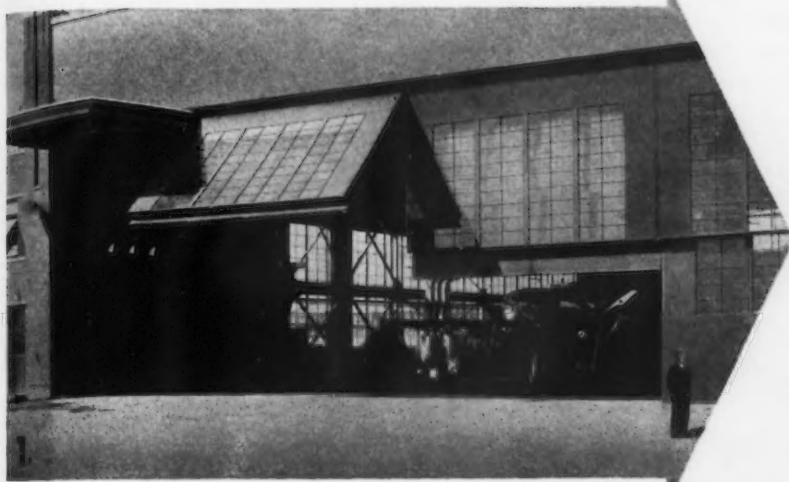
DIVISION OF ASSOCIATED SPRING CORP.

COOK PLANT

← TWO PLANTS → ANN ARBOR, MICHIGAN

1. DEPENDABLE
2. EFFICIENT
3. ECONOMICAL

... these alloys of NICKEL



1. HANGAR MAINTENANCE:

The Dominion's largest doors, on Trans-Canada Airway's new hangars, are opened and closed by Nickel steel worms and chill-cast Nickel bronze gears. To obtain tensile strength of 51,000 p.s.i. the Richards-Wilcox Canadian Co., Ltd., London, Ontario, Canada, specified these gears cast with this composition: copper, 87.50%; tin, 11.00%; Nickel, 1.50%. The addition of Nickel to bronze improves density and strength without impairing anti-frictional qualities of gear surfaces — assures long trouble-free service life.



2. BOTTLING OPERATIONS:

Metals used in bottling equipment must be corrosion resistant, strong, bright and attractive and be able to withstand repeated cleaning operations. Above all they must be non-contaminating to safeguard the beverages with which they come in contact. Solid Nickel Silver possesses these improved properties. Combining good structural qualities with resistance to corrosives, and eye appeal, it can be readily and repeatedly cleaned because there are no platings or coatings to wear away or flake off. Therefore, the Crown Cork and Seal Co., Baltimore, uses Solid Nickel Silvers for many parts of their high speed bottling and capping machines which come in contact with the beverages.



3. FOUNDRY PRACTICE:

Shrinks and cracks forced remelting of one of every four swing spout fixtures! That was the unprofitable record of the Universal Brass Manufacturing Co., Los Angeles. Rejects ate the heart out of profits. By adding 1% Nickel grain structures were refined making castings so pressure-tight and sound, that 90% of rejects were avoided. The uniformity of Nickel-bronzes cuts machining costs, too. Consultation is invited on money-saving applications of Nickel alloyed materials.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

Bids Received by Government On Manganese, Chromium, Tungsten

WASHINGTON—Bids on manganese, chromium and tungsten ores, the first to be called for under the new \$100,000,000 strategic and critical materials purchasing program, were opened by the Treasury's Procurement Division last week, with seven companies offering to sell manganese from foreign sources, and seven submitting bids for domestic producers. No foreign bids were received from major sources of chromium and tungsten ores but Chinese and Cuban producers submitted bids on tungsten.

In general, foreign bidders on manganese attached numerous conditions to their bids, most of which centered around anticipated shipping difficulties in the face of European conditions. Bids on domestic manganese indicated producers in six states—Virginia, West Virginia, Utah, Montana, New Mexico, and California—were anxious for Government orders. One company offered to supply 98 per cent manganese at \$134.40 a ton.

Details follow:

Manganese Bids—Foreign Sources

Debevoise Anderson Co., Newark, N. J., 3000 tons; without duty, \$24 per ton; with duty, \$29.38 per ton; quality, 48 per cent.

William H. Miller & Co., New York; Durban, South Africa, shipping point; 48 per cent manganese ore, 10,000 tons; without duty, \$244,704; with duty, \$298,464. Seller not liable for delivery on account of war conditions.

H. S. Davis Co., New York; Durban, South Africa, shipping point; quality, 48 per cent; could deliver up to 40,000 tons; less duty, \$20.88 per ton; with duty, \$24.256 per ton; agrees to deliver on board ship; will guarantee against financial losses but not against replacing.

Derivatives, Inc., New York; Durban, South Africa, shipping point; quality, 48 per cent; 3400 tons; less duty, \$97,593.60; with duty, \$115,885.60.

Cuban American Manganese Corp., San Diego; Cuba is the shipping point; 25,000 tons, 50 per cent manganese ore; \$765,000. There is no duty from Cuba.

Watson Geach Co., New York; South Africa, shipping point; 10,000 tons, 46 per cent manganese ore; 42c. a unit. Leonard J. Buck, Jersey City, N. J., agent for Sovuspromexport, Moscow, USSR.

| No. Tons | Less Duty | With Duty |
|----------|-----------|-----------|
| 8,000 | \$199,920 | \$245,616 |
| 15,000 | 374,850 | 460,530 |
| 20,000 | 499,800 | 614,040 |
| 25,000 | 624,750 | 767,550 |
| 30,000 | 749,700 | 921,060 |
| 35,000 | 874,650 | 1,074,570 |
| 40,000 | 999,600 | 1,228,080 |

51 per cent manganese ore. Seller not responsible for delays. Insurance to be paid by buyer. Bidder wants 10 years to supply ore. (Law calls for delivery over a period of four years.)

Manganese Bids—Domestic Sources

Oliver & Co., Cleveland; Alta Vista, Va., shipping point; mines in Campbell County, Va.; 5000 tons at 6c. per lb. or \$134.40 per ton; quality, 98 per cent. If quality is 48 per cent, cost will be \$44.80 per ton. 15,000 tons of 48 per cent, \$45; 25,000 tons of 48 per cent, \$42.50.

Greenbrier Mining Corp., White Sulphur Springs, W. Va.; 5000 tons, \$180,000, f.o.b. cars White Sulphur Springs, Va.

L. E. Kramer, Tooele, Utah; delivery

at Jericho, Utah; 5000 tons of 40 per cent manganese at 40c. a unit.

Domestic Manganese & Developing Co., Butte, Mont., 15,000 tons; 55 per cent manganese ore at 67c. a unit.

Luna Mining Co., Jackson, Mich.; Deming, N. M.; 15,000 tons, \$1,202,400. It could sell 15,000 more tons, \$1,159,200.

R. L. Gilmore, D. A. Kendall, Los Angeles, Cal., Silver Lake, Cal., shipping point; 5000 tons at 77c. a unit.

F. W. d'Friess, Grand Junction, Colorado, mine at Green River, Utah, shipping point; 5000 tons of 50 per cent manganese ore, \$126,650.

Chromium Ore

U. S. Chromium Mines, San Francisco; 6000 tons to be delivered to New Cumber-



An Assist! By ATLAS
View at Prominent Iron Foundry
To Lower Costs!

Here Atlas - designed, Atlas - built equipment moves heavy scrap and other charging materials with consummate ease.

Monorail deposits empty bucket on roller conveyor. Bucket rolls down to scale platform, is charged with iron, weight read from yard crane cab. Scale platform lowers, turns, bucket rolls down to monorail for pick-up and charge to cupola.

A propitious circle, presaging profit at the year-end—and a definitely typical Atlas installation.

THE ATLAS CAR & MFG. CO.

Engineers

CLEVELAND, OHIO

Manufacturers

serving the world with mobile handling equipment

land, Md., \$0.03255 lb.—\$210,000; Ogden, Utah, \$0.03162—\$204,000; New Cumberland, Md., 45,000 tons at \$0.03255 lb.—\$1,575,000; 48 per cent chromium.

Dorothea Reddy Moroney, San Francisco; Seldovia, Alaska, shipping point:

| Amount | Per Unit | Total |
|--------|----------|-----------|
| 25,000 | \$0.729 | \$875,000 |
| 30,000 | 0.729 | 1,050,000 |
| 35,000 | 0.729 | 1,225,000 |
| 40,000 | 0.729 | 1,400,000 |
| 45,000 | 0.729 | 1,575,000 |

All 48 per cent chromium.

Tungsten

Waah Chang Trading Corp., New York City; 0.002 tin; 150 short tons, \$24.50 per unit.

Metal & Ore Corp., New York, 1 per cent tin, \$25 a unit.

Pan-American Trading Corp., Havana, Cuba, 100 tons \$18 per unit plus \$5.50 import; 150 tons \$18 per unit plus \$5.50 import; 175 tons \$18 per unit plus \$5.50 import. Shipped from Isle of Pines, Cuba, 1½ per cent tin.

Waah Chang, New York, 425 tons, \$23.75 per unit plus \$7.93 import; Hong Kong, Burma, and Indo-China.

Government Steel Orders

WASHINGTON—Government contracts for iron and steel products, as reported for the week ended Oct. 14 by the Labor Department's Public Contracts Division, totaled \$1,471,322. For the same period covered, contracts for non-ferrous metals and alloys amounted to \$873,332; and for machinery, \$844,299. Details follow:

Iron and Steel Products

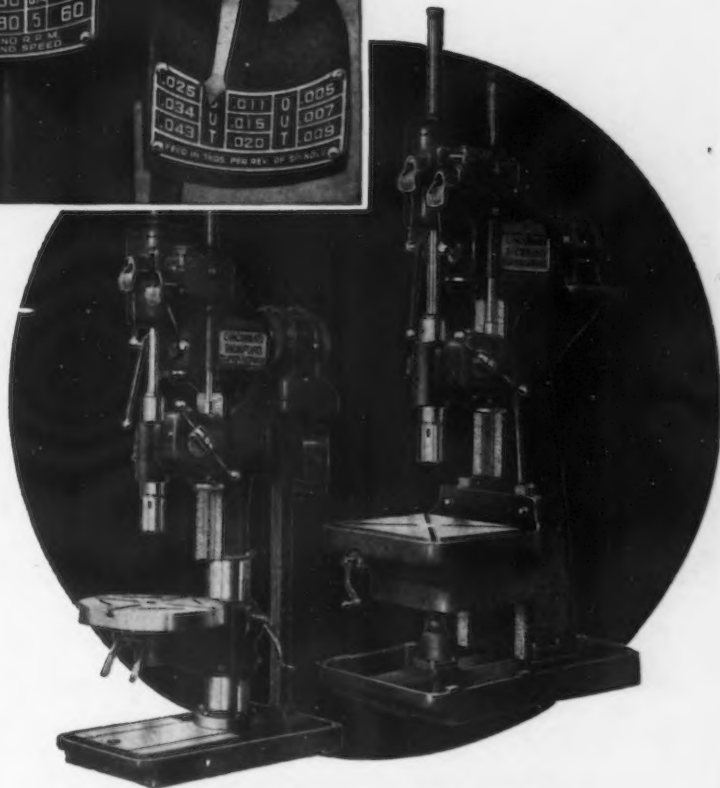
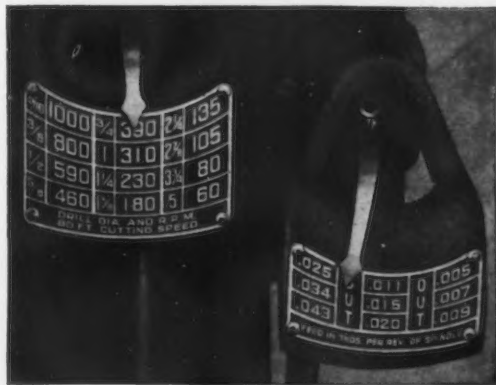
| | |
|---|-------------|
| Heppenstall Co., Pittsburgh, Navy Ordnance, housing forgings | \$41,360.00 |
| Camden Forge Co., Camden, N. J., Navy Ordnance, housing forgings | 30,988.31 |
| Pennsylvania Forge Corp., Philadelphia, Navy Ordnance, housing forgings | 46,900.10 |
| Harrisburg Steel Corp., Harrisburg, Pa., Navy S & A, steel forgings | 12,783.13 |
| Winters & Crampton Corp., Grandville, Mich., War QMC, mosquito-bar rods | 30,065.55 |
| Newton Junior Co., New Haven, Conn., War QMC, locks | 14,000.00 |
| Legion Utensils Corp., Long Island City, N. Y., War QMC, steel dish pans | 13,825.00 |
| The Mattatuck Mfg. Co., Waterbury, Conn., War QMC, links, spring | 14,040.00 |
| The R. Hardesty Mfg. Co., Denver, Interior, pipe, fittings | 11,880.00 |
| Bradford Supply Co., Inc., Wayne, Ohio, TVA, steel pipe | 17,745.00 |
| Ohio Seamless Tube Co., Shelby, Ohio, War Ordnance, steel tubing | 38,901.28 |
| Inland Steel Co., Chicago, War Engineer, reinforcement steel | 28,120.00 |
| Acme Steel Co., Chicago, War Ordnance, strip steel | 14,142.07 |
| Allegheny Ludlum Steel Corp., Watervliet, N. Y., War Ordnance, steel rods | 51,203.35 |
| Bethlehem Steel Co., Bethlehem, Pa., War Ordnance, steel rods | 54,439.68 |
| Carpenter Steel Co., Reading, Pa., War Ordnance, steel rods | 54,186.00 |
| Youngstown Sheet & Tube Co., Youngstown, Ohio, Interior, copper steel plates | 36,689.31 |
| Central Iron & Steel Co., Harrisburg, Pa., Navy S & A, steel plates, sheets | 153,465.75 |
| Washburn Wire Co., New York Division, New York City, War Ordnance, strip steel | 30,580.19 |
| Condenser Service & Engineering Co., Inc., Hoboken, N. J., Navy S & A, heaters, evaporators | 31,347.00 |
| Edge Moor Iron Works, Inc., Edge Moor, Del., War CWS, boilers | 41,000.00 |

| | |
|---|-----------|
| W. S. Rockwell Co., New York City, War Ordnance, forge furnaces | 10,920.00 |
| Simplex Wire & Cable Co., Cambridge, Mass., Norfolk Navy Yard, copper cable | 13,580.81 |
| John A. Roebling's Sons Co., New York City, and Trenton, N. J., War Signal Corps, cable | 16,040.00 |
| R. L. Rettew & Co., Lebanon, Pa., War Ordnance, fuze adapters | 68,541.00 |
| Bethlehem Steel Co., Bethlehem, Pa., Naval powder factory, railroad material | 27,455.54 |
| Carnegie-Illinois Steel Corp., Boston, and South Chicago, War Ordnance, steel | 20,376.20 |
| Crosby Co., Buffalo, War Signal Corps, reel | 22,364.43 |
| Somaron Sheet Metal Works, Inc., New York City, WPA, duct work | 12,000.00 |
| Bethlehem Steel Co., Bethlehem, Pa., | |

| | |
|--|------------|
| War Ordnance, shell | 449,345.00 |
| Mitchell Metal Products, Inc., Cleveland, War Ordnance, metal packing crates | 21,300.00 |
| Clayton & Lambert Mfg. Co., Detroit, War Ordnance, shipping band assembly | 41,737.48 |

Non-Ferrous Metals and Alloys

| | |
|--|-------------|
| Advance Aluminum Castings Corp., Chicago, War Ordnance, hand cart wheels | \$16,957.50 |
| The American Brass Co., Waterbury, and Torrington, Conn., War Ordnance, cartridge brass cups | 181,900.00 |
| Imperial Brass Mfg. Co., Chicago, War Air Corps, fittings | 17,082.20 |
| Mueller Brass Co., Port Huron, Mich., War Ordnance, brass rod | 12,576.93 |
| Pennsylvania Smelting & Refining | |



MORE HOLES PER DOLLAR from SUPER SERVICE UPRIGHTS 21" 24" 28" All Geared



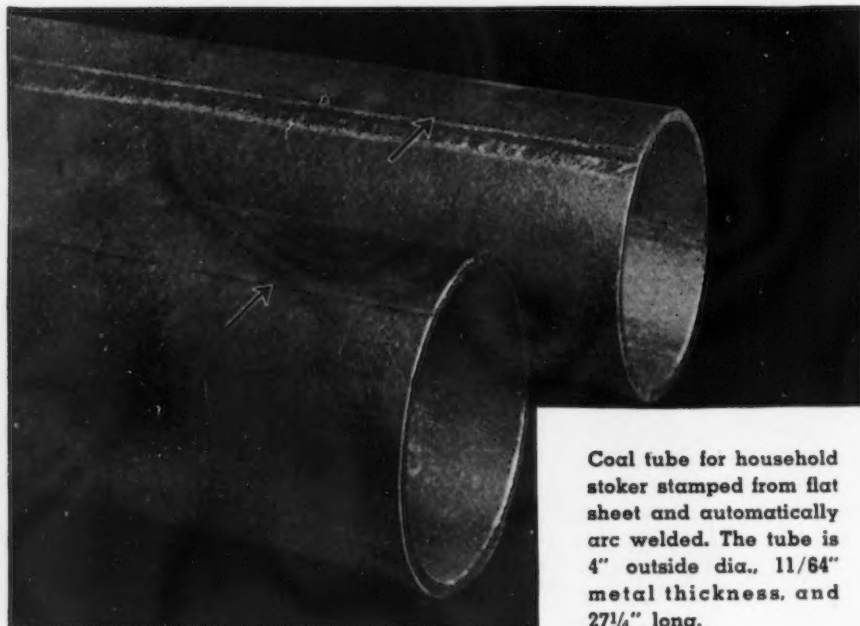
A wide range of useful drilling speeds and feeds, instantly available by direct reading single lever control, promotes rapid and efficient operation. Write for Bulletin U-25 giving full particulars.

THE CINCINNATI BICKFORD TOOL CO.
OAKLEY CINCINNATI OHIO U.S.A.

| | |
|---|------------|
| Co., Philadelphia, Navy S & A. pig lead | 17,283.63 |
| National Lead Co., Baltimore, Navy S & A, pig lead | 87,575.04 |
| Seovill Mfg. Co., Philadelphia, and Waterbury, Conn., Treasury, 5c. blanks | 107,000.00 |
| American Brass Co., Waterbury, War Ordnance, gilding metal | 28,342.50 |
| Youngstown Sheet & Tube Co., Youngstown, War Air Corps, specification metals | 20,391.25 |
| Revere Copper & Brass, Inc., Balti- more, War Ordnance, gilding metal tubing | 34,020.00 |
| Seovill Mfg. Co., Waterbury, War Ordnance, fuze metal parts | 213,925.00 |
| Seovill Mfg. Co., Waterbury, War Ordnance, booster metal parts | 112,878.90 |
| I. C. Newman Co., Inc., New York City, and Bethpage, N. Y., War Ordnance, flashlight powder | 23,400.00 |

Machinery

| | |
|---|-------------|
| Caterpillar Tractor Co., Peoria, Ill., Navy Marine Corps, tractors | \$20,429.00 |
| Caterpillar Tractor Co., Peoria, Ill., Panama Canal, tractors | 18,459.44 |
| Snow & Petrelli Mfg. Co., New Haven, Navy S & A, diesel en- gine parts | 13,014.75 |
| Caterpillar Tractor Co., Peoria, Ill., Procurement, tractors | 14,085.00 |
| Swind Machinery Co., Philadel- phia, Navy S & A, machines | 37,344.00 |
| William Sellers & Co., Inc., Phila- delphia, Navy S & A, boring ma- chine | 41,053.00 |
| American Tool Works Co., Cincin- nati, War Ordnance, engine lathes | 19,128.00 |
| Norton Co., Worcester, Mass., War Ordnance, grinders and equip- ment | 86,043.85 |



Coal tube for household
stoker stamped from flat
sheet and automatically
arc welded. The tube is
4" outside dia., 11/64"
metal thickness, and
27 1/4" long.

Welded By Carbon Arc Method With Automatic Head

These stamped and carbon arc welded coal tubes show another phase in the wide range of operations performed by Parish. Particular attention is called on this piece of work to the long difficult weld efficiently performed. Parish is prepared to meet your requirements on this and other types of work with the same degree of skill and precision.

Perhaps a study of your product by Parish Engineers will show how you can reduce the cost of parts in many ways. Their job is to help solve your problems, why not write today?

PARISH PRESSED STEEL CO.
READING, PA.

PACIFIC COAST REPRESENTATIVE, F. Somers Peterson Co., 57 California St., San Francisco, Cal.

| | |
|--|------------|
| Henry Prentiss & Co., Inc., New York City, War Ordnance, sur- face grinders | 14,454.00 |
| Pratt & Whitney Division Niles- Bement-Pond Co., Hartford, Navy S & A, precision lathes | 33,225.00 |
| Henry Prentiss & Co., Inc., New York City, Navy S & A, boring machine | 22,259.50 |
| William Sellers & Co., Inc., Phila- delphia, Navy S & A, horizontal machine | 36,415.00 |
| Cincinnati Milling Machine & Cin- cinnati Grinders, Inc., Cincinnati, Navy S & A, milling machine | 10,114.80 |
| Consolidated Machine Tool Corp., Rochester, N. Y., Navy S & A, boring and turning mill | 28,549.00 |
| Jones & Lamson Machine Co., Springfield, Vt., War Ordnance, shell turning machines | 49,428.00 |
| Davenport Machine Tool Co., Inc., Rochester, N. Y., War Ordnance, automatic screw machines | 18,556.75 |
| Gisholt Machine Co., Madison, Wis., War Ordnance, turret lathes | 11,861.30 |
| Warner & Swasey Co., Cleveland, War Ordnance, turret lathes | 13,842.00 |
| International Postal Supply Co., of New York, Brooklyn, N. Y., Pro- curement, check signing machines National Cash Register Co., Day- ton, Procurement, maintenance service | Indefinite |
| Royal Typewriter Co., Inc., New York City, Procurement, type- writers | Indefinite |
| Ditto, Inc., Chicago, Procurement, duplicating machines | Indefinite |
| Marchant Calculating Machine Co., Oakland, Cal., Procurement, com- puting machines | Indefinite |
| Bay City Shovels, Inc., Bay City, Mich., War Engineer, shovel | 12,375.00 |
| Ex-Cell-O Corp., Detroit, Navy S & A, pumps | 39,546.30 |
| Buffalo Pumps, Inc., Buffalo, Navy S & A, pumps | 27,820.00 |
| Ingersoll-Rand Co., Athens, Pa., and Phillipsburg, N. J., Panama Canal, sump pumps | 13,967.00 |
| "Automatic" Sprinkler Corp. of America, New York City, WPA, sprinkler system | 40,304.00 |
| York Ice Machinery Corp., Phila- delphia, Navy S & A, refrigerat- ing plants | 46,268.24 |
| Gardner-Denver Co., Denver, Pan- ama Canal, paving breakers | 13,158.00 |
| J. S. Mundy Hoisting Engine Co., Elizabeth, N. J., Norfolk Navy Yard, winch | 20,025.38 |
| Manning, Maxwell & Moore, Inc., Bridgeport, Conn., and Boston, Mass., Navy S & A, steel valves | 11,669.86 |
| Chapman Valve Mfg. Co., Spring- field, Mass., Navy S & A, steel valves | Indefinite |
| Crane Co., Chicago, Ill., Navy S & A, steam valves | 38,445.00 |
| Buffalo Forge Co., Buffalo, N. Y., Navy S & A, ventilating sets | 32,673.00 |
| C. H. Gosiger Machinery Co., Day- ton, Ohio, War Air Corps, shop equipment and machine tools | 20,732.00 |
| Weatherhead Co., Cleveland, War Ordnance, gears | 24,206.00 |
| Hanson-Van Winkle-Munning Co., Matawan, N. J., War Ordnance, plating unit | 14,847.00 |

More Apprentice Training Needed in Nation's Defense

WASHINGTON—The Army and Navy Munitions Board has advised industries expected to play a major part in the defense program that a shortage of skilled personnel may ultimately interfere with the Army and Navy procurement program unless steps are taken to train additional technicians.

Characterizing an expansion of apprentice training as "a vital element in national defense," the board said:

"The rising trend of business activi-

ty in recent weeks has accentuated the demand for skilled personnel and it is anticipated that a continuance of this trend will reveal shortages throughout industry which may seriously interfere with the existing procurement programs of the Army and Navy."

Apprentice training, which according to War and Navy Department heads has fallen below the requirements for normal replacements in skilled trades, is most needed for tool-makers, draftsmen, technicians, and other specialized aviation and ship-building trades.

Shipbuilding Activity Is Reduced by Italy

WASHINGTON — Shipbuilding activities in Italy are being appreciably curtailed during the current year, according to a report to the Department of Commerce.

During the first half of 1939, the keels of 24 vessels of 36,864 gross tons were laid down in Italian shipyards compared with 47 vessels of 46,808 tons at the end of June, 1938. Launchings in the first half of this year consisted of 36 vessels of 36,783 tons, against 47 vessels of 35,658 tons in the corresponding period of 1938.

As of June 30 this year, the Italian merchant marine fleet comprised 3651 vessels of 3,502,152 tons, an increase of 109 vessels over the June, 1938, fleet. Under construction at Italian shipyards were 82 vessels of 153,132 tons, compared with 83 vessels of 107,220 tons in June, 1938.

In addition there were 18 vessels of 84,285 tons to be completed after launching, compared with 19 vessels of 68,651 tons in June, 1938.

Army Asks Bids On 12,000 Motor Vehicles

WASHINGTON—The War Department has asked the automotive industry to bid on approximately 12,000 motor vehicles, to be purchased at an estimated cost of \$15,000,000. The additional motor equipment is wanted to place the five regular army streamlined divisions and essential corps troops in a condition suitable for field maneuvers. The invitations were originally issued early in September but have been amended in order to get additional vehicles for motorizing the army. Bids will be

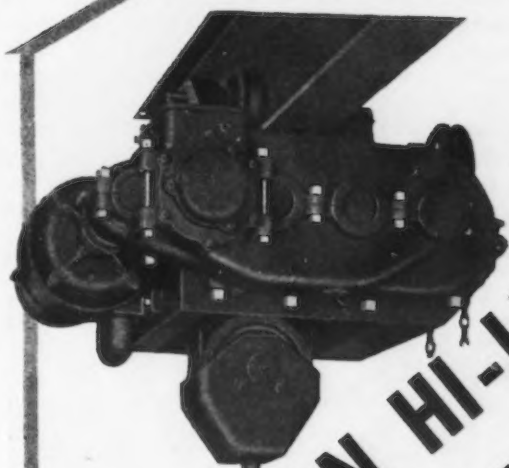
opened at the Holabird quartermaster's depot in Baltimore beginning Oct. 24. Meanwhile the War Department has authorized the construction of 18 large truck trailers, which, when delivered, will become mobile recruiting stations.

The motor vehicles to be purchased comprise trucks, ambulances, passenger and reconnaissance cars. The trucks will be four-wheel drive types and are to be delivered before April 30, 1940.

British Engineers Honor Ford and A. G. Christie

THE award of honorary life membership in the Institution of Mechanical Engineers, of Great Britain, has been made to two members of the American Society of Mechanical Engineers, Alexander G. Christie, president of the society and professor of mechanical engineering at Johns Hopkins University, and Henry Ford.

You don't have to raise the roof...



**New
NORTHERN HI-LIFT HOIST
Gives You MORE HEADROOM**

Headroom costs plenty when you have to build it into the plant. Every inch of height eliminated makes substantial saving. • The New Northern Hi-Lift Hoist enables you to get along with less total headroom because it uses more that is already available. It lifts close to its supporting beam—allowing higher piling in storage space—easier handling of bulky loads everywhere. • It is stronger—has more lifting power. All mechanism is completely accessible. Mechanical brake parts may be removed without opening the gear case. • A variety of sizes and types—Northern is a long life, low cost Hoist.

NORTHERN ENGINEERING WORKS

Detroit, Michigan

CRANES *Northern* **HOISTS**

Washington Doubts War Boom Can Eliminate Relief Rolls

WASHINGTON—Tying in with what some New Deal economists regard as their No. 1 job for the weeks ahead—attempting to curb price rises and prevent accumulation of inventories—is the question of what will happen to employment. Striking the same pessimistic note to harmonize with the forecast that business is in for a collapse early next year unless certain signs are heeded, these advisers have sent out word not to expect a complete elimination of WPA relief rolls and a total absorption of the unemployed as a result of war-stimulated business.

Government economists whose job it is to watch the unemployment picture are closely following figures which show that since last August more than a million persons have gone back to work; that 250,000 found jobs in August; 400,000 more in September. Whether this rise can continue at that pace depends, according to this line of reasoning, upon how much the per-

son who gets a job can buy. The argument is made that unless payrolls increase to take care of what New Dealers regard as an excessive output, the whole business structure is going to face difficulties in the spring.

Buying Power Must Rise

Further, the purchasing power of those employed, they contend, must not only go up in proportion to the rise in production but it must go beyond that in order to take care of any price rise.

One Administration adviser recalls that representatives of the steel industry have mentioned to him the tremendous savings effected in labor costs by increasing output. Yet these savings, it is emphasized, are being lost due to the increase in prices of raw materials. Without indicating whether he adhered to the Government school of thought that price increases in steel would be unfortunate at this time, it was plain that he believed

higher prices for the first quarter were definitely in the cards.

Government advisers also have been told about one automobile manufacturer who has ordered a year's supply of steel, and about an oil company ordering a year's supply of steel tanks. Without offering any suggestions as to what alternative should be followed, they merely raised the question of what will happen during the next 12 months when these buyers will no longer be in the market.

Inventories Moderate

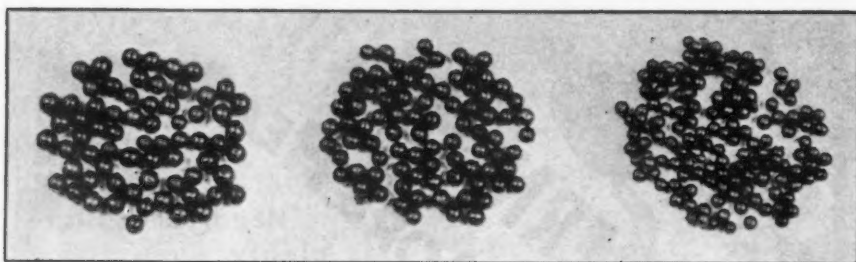
Despite these advices on the inventory situation reaching Government officials, reports from the steel industry indicate that as a whole there is an approximate balance between production and consumption. In general, these reports are that there are no inventories at steel plants, very small ones at first and second line steel consumption plants, and only moderate ones at plants where finished products are assembled.

But in any event all factors are being weighed by Government forecasters who insist that the country in attempting to absorb the unemployed through the war-stimulated orders, is going to face an almost insurmountable job. Even if war orders come in at a tremendous volume, these economists insist that the country will have a long way to go before the level of employment obtaining in 1937 is reached.

Department of Labor figures show that in September, 1929, there were about 11,000,000 persons employed in what it classifies as manufacturing and mining. That figure was almost reached again in September, 1937, whereas today the total is around 9,000,000. In substantiation of their contention that there already is a lag in employment, these advisers point to Federal Reserve Board estimates that today's production level is rapidly approaching the 1929 peak.

Housing Believed the Key

One factor due to figure more prominently in the business picture, so far as Government advisers are concerned, is the subject of stimulating the housing industry along with plant expansion resulting from war orders. Administration lieutenants have been harping continuously in the past six years about the stimulated housing industry being the key to a well-rounded business recovery, and the advent of war in Europe has not altered their view. In fact, Assistant Attorney General Arnold is currently



IN the period of one year we have built up a very large business with our Heat-Treated Steel Shot and Heat-Treated Steel Grit. This was accomplished on purely a quality product. Our many hundreds of customers, nationally known Concerns, are using our Shot and Grit, and sav-

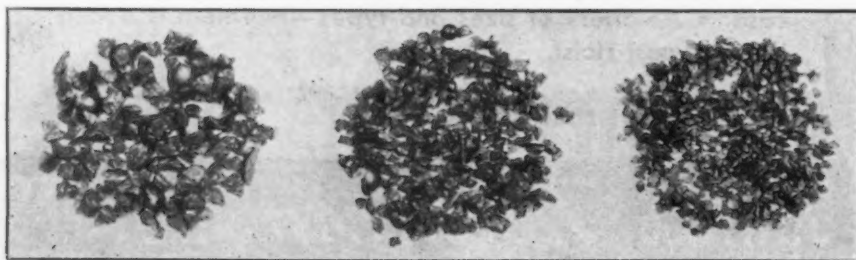
ing money every day, blasting faster with less wear of abrasive. Our heat treating insures toughness and strength, fast blasting and long wearing. Try it in your machine and prove the truthfulness of these statements.

**We never
compromise
with quality.**

**A ton or a carload.
Will match any size.**

HARRISON ABRASIVE CORPORATION

MANCHESTER, NEW HAMPSHIRE



talking about making housing the "stabilizer" for the months ahead.

Some New Deal advisers like to look back to 1917 and 1918 when, they insist, the expansion of industry did not go hand in hand with an expansion of housing facilities because industry gave little or no consideration to the housing problem. On this basis, the Administration can be expected to push the housing idea further in terms of war-stimulated demand, stressing the likelihood that, in the light of present-day labor relations, housing construction will be put in the same category as plant expansion on the assumption that one is just as important as the other.

Survey of U. S. Scrap Supplies is Started by Bureau of Mines

WASHINGTON—Assigning national defense requirements as one reason for the undertaking, Secretary of the Interior Harold L. Ickes has announced that the Bureau of Mines has begun a survey of dealers and consumers' stocks and the rate of consumption of iron and steel scrap for September, 1939. Results of the survey are expected to be announced about the middle of November but will not be complete. Surveys of scrap consumption on an annual basis were begun by the bureau in 1935.

The Secretary said that Director John W. Finch of the bureau had advised him that the new survey has been endorsed by the Army and Navy Munitions Board and that the full cooperation of the American Iron and Steel Institute on behalf of the consumers and of the Institute of Scrap Iron and Steel and the National Association of Waste Material Dealers on behalf of the dealers has been pledged.

The survey, according to Mr. Ickes, will make available authentic information on stocks of iron and steel scrap "a matter of unusual significance from the viewpoint of national defense."

The action was declared to be in keeping with the previously announced policy of the Bureau of Mines to present timely factual data on the strategic and highly essential mineral raw materials during the present international crisis. Scrap was said to be regarded "as a vital industrial raw material" because of its importance to the steel industry.

Adequate data are available on iron ore and pig iron, he said, but little is known as to the present stocks of scrap. The need for supplying this

*"when
springs
get in
your hair"*

Let the Dunbar "Baldies"
come to the rescue ---



You save time . . . often money . . . by delegating the design and manufacture of your springs to Dunbar specialists. Ninety-four years spent solely in the making of all sorts of springs.

DUNBAR BROS.CO.
DIVISION OF ASSOCIATED SPRING CORPORATION
BRISTOL CONNECTICUT

Quality Springs since 1845

Coal comin' up...via

R & M!



R & M Electric Wire Rope Hoist; 1-ton capacity; push-button control; speed, 40 ft. per min. (also available in faster or slower speeds).

This R & M Electric Hoist takes coal from storage by means of a rolling bottom-dump bucket—and keeps the stokers stoking. It is designed to use little current and operate dependably, economically, year after year. It's another example of the way R & M Hoists and Cranes are engineered and precision-built to fit the job.

Let R & M engineers tackle your problem. Briefly outline it in a letter—you'll get action!

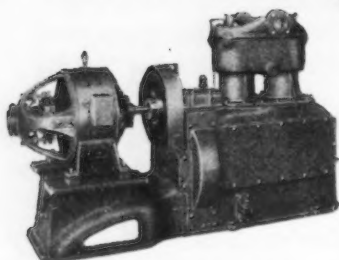
ROBBINS & MYERS • INC.

HOIST & CRANE DIVISION

SPRINGFIELD, OHIO

Investigate!
AIR . . .
COMPRESSORS
by Westinghouse
AIR BRAKE CO.

For
Varied
Pneumatic
Requirements



2-V COMPRESSOR
(one of many types)

Two cylinder, single acting, gear driven — 75 to 200 cu. ft. Three forms. Single stage, air cooled, intermittent operation, 40 lbs. pressure. Single stage, water cooled, continuous operation, 120 lbs. pressure. Two stage, air cooled, continuous operation, 135 lbs. Motors for any commercial circuit.

Write for information and prices.

Catalogue
T-2047

Builders of
high grade pneumatic
apparatus for 70 years

Westinghouse
AIR BRAKE CO.
Industrial Division
PITTSBURGH, PA.

major deficiency in facts pertaining to the iron and steel industry was said to have been acknowledged widely by leaders in industry and Government, and the Secretary urged "the patriotic cooperation of both suppliers and consumers in contributing accurate and prompt reports on their scrap position to the Bureau of Mines."

Andrews Replaced by Army Officer as Wage-Hour Head

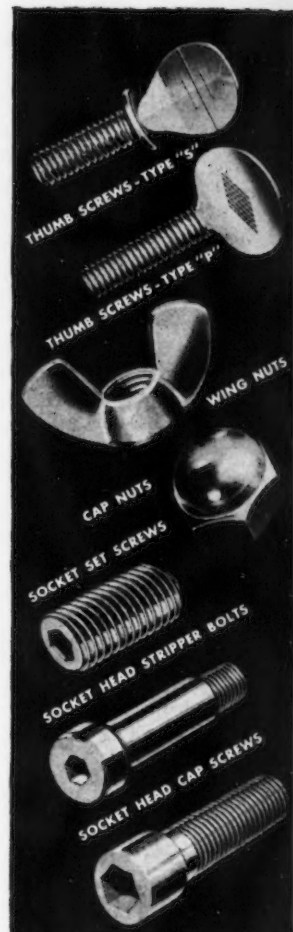
WASHINGTON — Automatic changes in the Fair Labor Standards Act, which boost minimum wages from the former 25c. rate to 30c. an hour and reduce the maximum work week from 44 to 42 hr., went into effect for employees working in interstate industries on Tuesday, Oct. 24, which marked the first year of operation under the law.

The change found an extensive administrative shake-up under way in the Labor Department's wage-hour division, with Elmer F. Andrews, former wage-hour administrator, succeeded by Col. Philip Fleming, of the United States Army engineers, who has worked for the New Deal in several engineering capacities including supervision of the controversial Passamaquoddy tide-harnessing project. Other administrative changes were in the offing.

Mr. Andrews' resignation is attributed partly to White House dissatisfaction and partly to internal pressure within the Labor Department although it is understood that President Roosevelt and Secretary of Labor Frances Perkins were not in complete accord as to why a new administrator was desirable. Public statements and administrative decisions reflecting a viewpoint not subscribed to by other Administration lieutenants, and recent criticism that the division had set too slow a pace in fixing wages above the minimum as recommended by industry committees were believed to have hastened the departure of the former wage-hour administrator.

Gives No Reason for Quitting

Mr. Andrews, former New York State Industrial Commissioner, gave no reason for his action in a letter of resignation to Mr. Roosevelt. In reply, the President merely said he recognized the "complexities" of the job, expressed appreciation for Mr. Andrews' "pioneering" work, and accepted the resignation. Mr. Andrews



You be the Judge

OF THE QUALITY AND
PERFORMANCE OF THESE
SUPERIOR PRODUCTS

On any basis — strength, accuracy, uniformity — these Parker-Kalon Cold-Forged Products pass every test with flying colors.

But you be the judge of that! Test them in your own plant, in your own way, under actual operating conditions. Find out why thousands of users have switched to Parker-Kalon. Send for samples today. No obligation.

PARKER-KALON CORPORATION
200 Varick Street, New York, N. Y.

PARKER-KALON
Cold-forged
SOCKET SCREWS
WING NUTS · CAP NUTS
THUMB SCREWS

SOLD THROUGH
REPUTABLE DISTRIBUTORS



BETTER WELDS CHEAPER

Table tilts 135° from horizontal.

(See lower illustration)

Table can be rotated 360° when tilted at any angle.

Table is removable if desired for special requirements.

Adjustable in height.

2500 lb. and 6000 lb. capacities.

Write for
WELDING-POSITIONER
Bulletin WP-19

**CULLEN - FRIESTEDT
COMPANY**

1303 S. Kilbourn Avenue,
Chicago, Illinois

LOCOMOTIVE CRANES - SHEET
LIFTERS - BUCKETS - CONVEYORS

is expected to take an engineering post at the Reconstruction Finance Corp. Colonel Fleming was named assistant to the acting wage-hour administrator but in effect he will be the agency's top official.

Since the maximum work week has been changed from 44 to 42 hr., any hours worked in excess of 42 will hereafter have to be compensated at the rate of time-and-one-half under the law. Midnight, Oct. 23, was fixed as the deadline, after which the overtime rate is applicable to hours worked in addition to the first full work week.

It has been estimated that about 650,000 workers in all industries will get pay increases and an additional 1,110,000 will get shorter hours or overtime pay as a result of the automatic changes. Wage-hour officials estimated that 450,000 employers, employing more than 12,000,000 workers, are covered by the provisions of the law. The end of the first year of its operation found but two industries in which wages above the general minimum have been fixed by order of the division.

15,000 Workers Get Jobs at Cleveland

CLEVELAND—Payrolls continue to expand throughout northern Ohio. A study of Cleveland employment shows that 1600 firms employed 242,565 persons during September as compared with 219,004 in the corresponding month of 1938. It is estimated that around 15,000 workers have been added during the past 60 days.

Plant employment for Youngstown and nearby cities is gaining. More than 3500 men have been added to the payrolls of the three large steel producers in Mahoning County since July 1. WPA employment there decreased from 9191 in January to 4013 at the start of October. The Sharon, Pa., Chamber of Commerce reports the payroll of Shenango Valley plants during September was \$1,035,263 compared with \$929,000 in August.

At Toledo 51 plants which regularly report their employment monthly added 1335 workers in the week ending Oct. 14, to bring their total to 20,665 contrasted with 14,943 at the same time last year.

Industrial employment records at Mansfield show 9865 persons on payrolls at the end of September against 9010 at the end of August, a gain of 9.4 per cent.

NEW! BETTER!

PLATING RACK COATING

Lasts Longer, Cuts Costs



THE RESULT of extensive research by United Chromium, Inc. Unichrome® Rack Coating-W provides a combination of important advantages found in no other rack coating material. Already in active use in many plating shops, it has produced amazingly fine results.

MANY ADVANTAGES

1. Not affected by boiling cleaners or plating solutions.
2. Does not blister or crack.
3. Tough—withstands wear and tear of normal handling.
4. Contains no ingredient harmful to any plating solution.
5. Cuts costs—by greatly reducing frequency of recoatings.
6. Easy to apply—by "dip and force-dry" method.
7. White in color—easy to see how completely the rack is covered.
8. Any part of rack can be recoated without necessity of recoating entire rack.

PROVED ECONOMY: Companies who have thoroughly tested Unichrome Rack Coating-W are without exception enthusiastic about it. Reports show that some racks coated with this material have gone through over 1,000 plating cycles without any insulation breakdown.

Write for Bulletin No. 15
containing complete information

Platers without rack dipping and drying facilities may have their racks coated with Unichrome Rack Coating-W by making arrangements with Chromium Corporation of America, 4645 West Chicago Avenue, Chicago, Illinois, or Lea Manufacturing Company, Waterbury, Conn.

**UNITED
CHROMIUM**
INCORPORATED

51 East 42nd Street, New York, N.Y.
2751 E. Jefferson Ave., Detroit, Mich.
Waterbury, Conn.

*Trade Mark
Reg. U.S. Pat. Off.



PERSONALS

L. M. KIRK has been made superintendent of the No. 2 open hearth, GEORGE McMORRAN becomes assistant superintendent of the No. 2 open hearth, and I. G. BROWN has been appointed assistant superintendent of the No. 4 open hearth at the Gary works of Carnegie-Illinois Steel Corp.

Mr. Kirk went to Gary works as superintendent of mold preparation in January of this year from the Worth Steel Co., Claymont, Del., where he had been assistant open hearth superintendent since 1936. Prior to that time he was employed for five years by the Bethlehem Steel Co., Johnstown, Pa., as assistant master mechanic, general foreman of open hearth gas house, general foreman stock yard, and general foreman open hearth pit and mold preparation building.

Mr. McMORRAN was first employed at Gary works in 1937 as general foreman of the No. 2 open hearth after 25 years of service with the National Tube Co., American Steel & Wire Co., Illinois Steel Co. and Youngstown Sheet & Tube Co. He was made assistant superintendent of the No. 4 open hearth in May of this year and remained in this capacity until his present appointment.

Mr. Brown began his employment at Gary works in 1938 as a metallurgist, the position he held until his present appointment. He was formerly identified with Midvale Steel Co., Bethlehem Steel Co., National Tube Co. and Jones & Laughlin Steel Corp.

♦ ♦ ♦

JOHN W. YOUNG has been elected president and general manager of Hayes Body Corp., succeeding the late Edward J. Connolly. Mr. Young has resigned as executive vice-president of Breeze Corporations, Inc., Newark, N. J., where he directed the manufacture of aircraft and military equipment, and as president of Federal Laboratories, Inc., Pittsburgh, manufacturer of ordnance supplies. He received his technical education at Carnegie Institute of Technology and studied business administration at the University of Pittsburgh. The Hayes Body Corp. plans to enter the manufacture of parts and devices for aircraft, ordnance, shipping and armored bodies for automobile trucks.

♦ ♦ ♦

A. W. WILD has been named manager of the aircraft division of Continental Motors Corp., according to

C. J. REESE, president. D. H. HOLLOWELL has been appointed sales manager of the division, replacing W. R. ANGELL, JR., who recently resigned. J. B. FORNASER has been made sales engineer, R. D. HICKS will continue as division service manager and W. B. POWELL will be his assistant.

♦ ♦ ♦

J. D. LONG has been appointed acting manager of the Pittsburgh plant, Federated Metals division of American Smelting & Refining Co., succeeding I. A. SIMON, who has resigned. Mr. Long has been with the company 15 years and prior to his present appointment was in charge of sales.

♦ ♦ ♦

RALPH K. CLIFFORD, since 1937 works manager of the Kokomo division of the Continental Steel Corp., Kokomo, Ind., has been named vice-president in charge of operations for all of the company's plants. He has been identified with the Continental organization for 32 years. He began his career in the steel industry in 1907 with the Kokomo Steel & Wire Co., working during school vacation periods. For two years after his graduation from the University of Michigan in 1914 he taught in Michigan high schools, later becoming chief chemist, chief metallurgist and chief inspector at the Kokomo plant of Continental. He was appointed assistant general superintendent in 1923 and two years later general superintendent. He became works manager in 1937.

♦ ♦ ♦

JAMES S. KNOWLSON, chairman, Stewart-Warner Corp., Chicago, has also been made president. FRANK ROSS, one of the vice-presidents of the company, has been elected director and senior vice-president.

♦ ♦ ♦

E. G. PARSONS, who has been associated for several years with the William Schollhorn Co., New Haven, Conn., has been appointed district sales manager for the New England district and metropolitan New York.

♦ ♦ ♦

JOSEPH SMITHERS has been made district manager of sales in the Minneapolis-St. Paul territory for the Granite City Steel Co., Granite City, Ill. He will make his headquarters at 1310 Northwestern Bank Building, Minneapolis.



L. M. KIRK (left), superintendent of the No. 2 open hearth; and I. G. Brown, superintendent of the No. 4 open hearth.

D. J. Fox, vice-president of the Fretz-Moon Tube Co., Butler, Pa., has resigned to become assistant treasurer of the National Supply Co. A. R. TAYLER, formerly with Republic Steel Corp., has been appointed secretary-treasurer of the Fretz-Moon company.

♦ ♦ ♦

WILLARD A. TERRY, for several years associated with the welding section of the industrial department of the General Electric Co., Schenectady, N. Y., has been assigned to new duties in the company's Philadelphia office. He will have charge of electric welding sales along the Atlantic seaboard, effective Nov. 1. C. I. MACGUFFIE, arc welding specialist in the company Atlantic district, will take over Mr. Terry's duties in the industrial department in Schenectady.

♦ ♦ ♦

DR. LOUIS DAVIDSON RICKETS, consulting engineer, Pasadena, Cal., has been elected the James Douglas Gold medallist for 1940 by the American Institute of Mining and Metallurgical Engineers, for achievements in copper metallurgy.

♦ ♦ ♦

D. B. McCoy, who has been sales manager in the Toronto office of the Steel Company of Canada, Ltd., since 1922, has been appointed sales manager of the company with headquarters at the Hamilton office. Mr. McCoy started his career in the steel industry



No. 2 open hearth; George McMorran (center), assistant superintendent, No. 2 (right), assistant superintendent, No. 4 open hearth, Gary Works, Carnegie-Steel Corp.

in 1907 when he became associated with the Toronto and Belleville Rolling Mills, Belleville, Ont. When the latter company was taken over by the Steel Co. of Canada in 1910, Mr. McCoy took over the northern Ontario and Ottawa valley territory as salesman, and later was transferred to the Lake front area, including the city of Ottawa. In 1919 he was placed in charge of the Vancouver sales office and returned to take charge of the Toronto office in 1922.

CHARLES S. PHOENIX, formerly in the pig iron division of the Toronto office, succeeds Mr. McCoy as manager of sales. Mr. Phoenix joined the staff of the Steel Company of Canada, Ltd., in 1911 at the Hamilton plant and took over his duties as salesman in the Toronto office in 1922.

WARREN A. SILLIMAN has been appointed metallurgist of Cleveland Tractor Co., Cleveland, succeeding GORDON T. WILLIAMS, who resigned after nine years with the company to accept a metallurgical post with Deere & Co., Moline, Ill. Mr. Silliman has been with Cleveland Tractor for six years.

C. L. PETERSON has been appointed advertising manager of Cleveland Crane & Engineering Co., Wickliffe, Ohio, succeeding the late John R. Booher. Mr. Peterson has been with the company three and a half years,

following service with several electrical equipment companies.

E. A. SCHWARZENBERG, veteran Cleveland scrap broker, was honored Oct. 17 at a dinner meeting of the Northern Ohio chapter of the Institute of Scrap Iron and Steel, Inc., at Hotel Statler. He was presented with a gold wrist watch and honored for his contributions to the advancement of his industry over a period of many years.

W. W. ROSE, executive vice-president, Gray Iron Founders Society, Inc., Cleveland, was the principal speaker before the Wisconsin chapter, American Foundrymen's Association meeting in Milwaukee, Oct. 20, discussing "How Do You Sell Your Castings?"

B. F. HUNTER, chief lubrication engineer, Gulf Oil Corp., Pittsburgh, addressed the Milwaukee Engineering Society on "Theory of Lubrication by Use of Oils or Greases."

STEPHEN SMITH, New York engineer, spoke on "Flame Heating and Hardening" before the Milwaukee section, American Welding Society, at the City Club, Oct. 20.

W. R. OELSCHLAGER, general foreman of the Diesel division of the International Harvester Co., was the

principal speaker at the Racine (Wis.) chapter, American Society of Tool Engineers, at Hotel Racine, Oct. 16.

D. R. GRANDY has been named to head promotion activities of electric discharge lamps of the General Electric lamp department at Nela Park, Cleveland.

JOHN F. TINSLEY, president of the Crompton & Knowles Loom Works, Worcester, Mass., has been made president of the Associated Industries of Massachusetts for the fiscal year 1939-40.

WILLIAM O. LIPPMAN, works manager of the East Springfield, Mass., Westinghouse Electric & Mfg. Co. plant has been made a director of the Springfield Bank. Mr. Lippman succeeded LATHAN E. OSBORNE, who recently was transferred to Mansfield, Ohio, as works manager of the Springfield plant.

C. W. HEDLER, formerly manager of distributors' sales for the Norm-Hoffmann Bearings Corp., Stamford, Conn., and R. L. MILLER, for many years a member of the general sales staff, have been made assistant sales managers, reporting to H. J. RITTER, vice-president in charge of sales. WESLEY G. SARGENT, mechanical engineer formerly with the Frick-Reid Supply Co., Pittsburgh, has been assistant to Mr. Hedler, who will continue in charge of distributors' sales.

War Would Socialize U. S. Industry, W. H. Hartz Says

COMPLETE socialism of industry and permanent destruction of private enterprise will be the price this country will be forced to pay if it becomes involved in the European War, W. Homer Hartz, president of the Illinois Manufacturers' Association, predicted in an address last week before the southern division of the association, at St. Louis. Mr. Hartz is president of the Morden Frog & Crossing Works, Chicago.

"We, as business executives, must realize that participation by this country in war will probably mean the permanent destruction of our system of private enterprise, and perhaps the destruction of our democracy, which has as its foundation, our system of private enterprise," he said.

... OBITUARY ...

EDWARD A. NOLL, organizer of the National Tool Co., Cleveland, in 1905, and its head for 20 years, died Oct. 18 at his home in Cleveland. He was an authority on the manufacture of milling cutters and was noted for his success in hardening high speed steel. Mr. Noll was born in Cumberland, Md., in 1867. His first job was as a machinist for the Warner & Swasey Co., Cleveland, in 1883. Five years later he became foreman at the Standard Tool Co., a position he held for 14 years. In 1923 while still president of the National Tool Co. he organized the Nolvex File Co. and was head of this firm until 1937 when he was forced to retire because of ill health. During the Spanish American War Mr. Noll served as a captain in the Fifth Infantry of the Ohio National Guard.

HENRY G. STADEL, a designer for the Bailey Meter Co., Cleveland, died Oct. 16. He came to this country from Germany in 1900 and was employed as draftsman by Hobart Mfg. Co., Troy, Ohio. From 1906 until 1926 he worked as a tool designer for the National Cash Register Co., Dayton Motor Co., and the Ohmer Fare Register Co.

CARL R. YANSON, 53, vice-president and a director of the Ohio Cut Stone Co. and of the Cleveland Quarries Co., which acquired the Ohio Cut Stone Co. several years ago, died suddenly in the Hotel Biltmore, New York, Oct. 18.

GEORGE A. STEINLE, 74, founder and president of the Steinle Machine Co., Madison Wis., and widely known manufacturer and inventor, died at a Madison hospital following a 10-days' illness. He was designer of the Steinle turret lathe, and also designed the machinery with which the guns were made during the last war as head of the Four Lakes Ordnance Co., manufacturer of 5-in. navy guns. He was a native of Madison, and had for a time been associated with the Ball Brothers foundry and the Gisholt Machine Co. before opening his own plant.

J. MOORES JONES, 85, retired Racine, Wis., manufacturer, who from 1907 to 1923 headed the Racine Tool Machine Co., which he founded, died at a Racine hospital Oct. 11. He was born in Leesville, Ind., going to Racine in 1900 to found the Jones-Earl Shoe

Co., and later the Tool Machine company.

GEORGE B. HAMBLIN, vice-president and former works manager and purchasing agent of the Whitin Machine Works, Whitinsville, Mass., died at a Worcester, Mass., hospital on Oct. 20 after a long illness. Mr. Hamblin was born in Hyde Park, Boston, 63 years ago. He was associated with the company 40 years, first as a stenographer and finally as vice-president.

JOHN NICOL, foundry general superintendent of the Sibley Machine & Foundry Corp., South Bend, Ind., died on Oct. 16.

CHARLES E. BRAUM, since 1924 superintendent of the pole line hardware plant of Hubbard & Co., Oakland, Cal., died of a heart attack on Oct. 1. He had been identified with the company for 27 years and had worked his way up through the mill to the post of superintendent of the specialty department of the company's Pittsburgh plant before going to Oakland. He was 42 years old.

ARCHIBALD F. RADER, president of the Belmont Iron Works, whose death on Oct. 8 was noted in these columns last week, had been identified with the structural steel industry for 42 years. He was so anxious to get to work that he left the University of West Virginia in 1897 without waiting for the graduation exercises and went to work with a steel inspection company under Andrew Ferris, creator of the Ferris wheel. He later joined the Lassig Bridge Co. and left in 1901 to become identified with the Belmont Iron Works. He was made president of the company in 1936.

HENRY C. ANDERSON, dean of the College of Engineering of the University of Michigan, died suddenly Oct. 14 while listening to a radio description of the Michigan-Iowa football game. He had been ill 18 months of heart trouble. Dean Anderson was 66 years old and had been a member of the faculty since 1900.

ALBERT I. SANGER, 87, active in the iron and steel scrap business for 40 years at Cleveland, died Oct. 15 in Cleveland. He helped found the firm of Sanger & Harris.

LEONARD B. TOMB, 68, purchasing agent for the Oster Mfg. Co., Cleveland, died Oct. 15 at Cleveland.

WILLIAM SCHEFFNECHT, vice-president of the Harmony Stove Foundry, Belleville, Ill., died there following an operation. He had been ill for four months.

OTTO AGRICOLA, Gadsden, Ala., one of Alabama's most widely known industrial men, died in Gadsden on Oct. 18, at the age of 74, from a heart attack. Mr. Agricola was president of the Agricola Furnace Co., A. & J. Mfg. Co., First National Bank and other business interests. At one time he was a large producer of soil pipe, operating several plants.

JAMES B. CRAWFORD, a pioneer steel man of Birmingham, died Oct. 15 at the age of 69. He had been a resident of Birmingham for 56 years and is credited with having rolled Birmingham's first steel plate. Until 1911 he was connected with the old Linn Iron Works, at which time he organized the Crawford Vaughn Boiler & Locomotive Works. He was president of that company until a few years ago when it was dissolved.

WILBUR B. LEWIS, of Birmingham, traffic manager for the Alabama Mining Institute and the Woodward Iron Co., died Sept. 21, in a New Orleans hospital. Previously, he was traffic manager of the Sloss-Sheffield Steel & Iron Co. for a number of years.

24 A. S. T. E. Information Sheets Are Issued

MACHINE tools, wear strips, rotary bushings, bearings and fittings (couplings, valves, etc.) are subjects treated in the latest release of 24 standard data sheets by the American Society of Tool Engineers.

Included in these standard information sheets are five pages of data from Sundstrand Machine Tool Co. on milling machines and lathes, one page from Haynes Stellite Co. on wear strips, one page from Giern & Anholtt Co. on rotary bushings, one page from Bantam Bearing Co. on bearings and 16 pages from Parker Appliance Co. on fittings.

The A. S. T. E. also distributed with its data sheets a booklet entitled "Safety Code for the Use, Care and Protection of Abrasive Wheels," by the Carborundum Co. and a booklet "Machine Tools and You" supplied by the National Machine Tool Builders Association.

Enameling Problems Discussed At Porcelain Institute Forum

MORE than 200 members of the industry attended the fourth annual Porcelain Enamel Institute forum held at Ohio State University, Columbus, Oct. 18 to 20. The program, which covered a wide variety of practical enameling problems, attracted registrants from all sections of the country, as well as visitors from India, Brazil and Canada.

One of the most significant sessions was that on architectural enameling. With the gains made recently in the sale of porcelain enameled store fronts and other architectural parts, the papers presented in this session were particularly interesting to members of allied industries, such as iron and steel.

A. C. Weierich of Davidson Enamel Products, Inc., opened this session with a discussion of "What the Jobbing Shop Must Do to Handle Architectural Work." The architect's viewpoint was expressed by W. S. Arrasmith who pointed out that, although porcelain enameled steel clearly has an excellent future as a building material, it has not been sufficiently "sold" to architects and to the consumer.

J. H. Wilson, American Rolling Mill Co., completed the program on architectural enameling with a paper on "Development of Specifications That Will Meet Building Code Requirements."

Talk on Drawing Compounds

The Thursday morning session on sheet iron and hollow-ware included a talk on drawing compounds by G. W. Dykstra of the Kelvinator Division of Nash-Kelvinator Corp. and a paper by E. H. Shands of the George D. Roper Corp. on "Use of Softened Water in Cleaning and Pickle Room Practice."

M. A. Snell contributed to this session a thorough presentation of "Health Hazards and Their Control in Pickling Operations."

In the Thursday afternoon hollow-ware session, John C. Crombie, Carnegie-Illinois Steel Corp., delivered a paper on "The Effect of Variations of Annealing Between Draws." During the past few years, as a result of the improvement in the stamping quality of steels used for hollow-ware, it has been possible to eliminate much of the annealing formerly found necessary between draws. Nevertheless, Mr. Crombie pointed out, there are still

many severely drawn articles which do require an intermediate anneal.

Mr. Crombie's paper presented the results of a study to determine the optimum annealing temperatures that will provide the maximum drawing qualities for subsequent operations. Annealing temperatures, he said, must be carefully controlled so as to avoid development of abnormally large grains and their attendant lack of ductility. A series of recent tests led to the conclusion that there are two alternatives which can be taken in annealing drawn articles.

The first is to anneal below 1100 deg., under which condition drawing strains are relieved. Secondly, if succeeding draws are deep, the annealing

should be conducted above the transformation temperature.

One of the most pertinent papers of the meeting was presented at the final session Friday afternoon by R. F. Bisbee of the Westinghouse Electric and Mfg. Co. Mr. Bisbee discussed "Inspection, Packing and Field Problems of Porcelain Enameled Products." He described the detailed system of receiving inspection on suppliers' products employed by Westinghouse in its Mansfield enameling plant.

The annual banquet meeting featured an address by Dr. William E. Wickenden, president of the Case School of Applied Science, whose subject was "Applied Arithmetic — Division or Multiplication."

Bennett Chapple, American Rolling Mill Co., was the toastmaster at the banquet meeting, with J. E. Hansen of the Ferro Enamel Corp. introducing Dr. Wickenden.

Industry Must Sell Democracy, Hook Tells Hardware Makers

INDUSTRY is faced with the responsibility of defending democracy by merchandising the facts concerning free enterprise, Charles R. Hook, president, American Rolling Mill Co., told the American Hardware Manufacturers Association annual convention, Atlantic City.

"It is not enough merely to see that the facts (regarding democracy) are presented to our employees, customers, and suppliers," Mr. Hook said. "We should also see that the story of the progress and the benefits of business should be presented to all those not directly engaged in industry."

To place itself on record against participation by the U. S. in a European war, the National Association of Sheet Metal Distributors, which met Oct. 16-19 in conjunction with the hardware manufacturers and the National Wholesale Hardware Association conventions, approved a resolution urging that members use "their best efforts to impress upon all with whom they come in contact that the domestic well being of our own country should be our first concern and that the stimulus of war orders is entirely counteracted by the depressing reaction following hostilities."

Such a stimulus of business may be expected, said Dr. Leverett S. Lyon, executive vice-president, Brookings Institution, as long as Great Britain

and France can pay for war goods. Other speakers forecast still heavier defense expenditures by the U. S. Government in 1940 while H. B. Wilson, Mathias Klein & Sons, Chicago, told the hardware manufacturers that industry should resist any price advance for which the reason cannot be clearly demonstrated. Mr. Wilson was elected president of the manufacturers' organization.

"Participation by the United States in Europe's present conflict would do more to upset your achievements of the past decade than any other conceivable threat," E. L. Shaner, editor, *Steel*, told the sheet metal distributors. The more industry can avoid relying upon war orders, the better off it will be, he said.

The sheet metal distributors elected A. W. Howe, J. M. & L. A. Osborn Co., president, A. J. Becker, Ohio Valley Hardware & Roofing Co., Evansville, Ind., first vice-president, and Eugene Foley, Bayonne Steel Products Co., Newark, second vice-president. The hardware manufacturers re-elected Mr. Wilson as president, and Richard Harte, Ames Baldwin Wyoming Co., Parkersburg, W. Va., P. E. Barth, Sargent & Co., New Haven, Conn., and N. J. Clarke, vice-president, Republic Steel Corp., as vice-presidents, with Charles F. Rockwell, again secretary and treasurer.

... THE NEWS IN BRIEF ...

United Engineering & Foundry Co. orders run 25 per cent above level of post-war period.—Page 42.

Strike at Dodge plant continues to tie up Chrysler. Total production eases off to 74,114 because of strike. Hayes Body makes plans for military production under new president. Divco contracts to furnish bodies to GM for delivery trucks.—Page 48.

Consolidation of power committees interpreted as setback for Assistant War Secretary Johnson.—Page 52.

Washington is told American industry fears war's effects on U. S. economic system.—Page 52.

Reich's exports of diesel engines in 1938 topped United States, Great Britain, other countries.—Page 54.

War Department places \$833,880 order for aircraft engines with Lycoming division, Aviation Mfg. Corp.—Page 54.

Government receives bids on manganese, chromium and tungsten ores.—Page 56.

Government steel purchases for week ended Oct. 14 total \$1,471,322.—Page 57.

More apprentice training needed, Munitions Board tells industry.—Page 58.

War Department asks bids on 12,000 motor vehicles to motorize army.—Page 59.

Shipbuilding activity in Italy curtailed, with 24 keels laid down in first half of 1939 against 47 in like 1938 period.—Page 59.

Alexander G. Christie, Johns Hopkins professor, and Henry Ford are honored by Institution of Mechanical Engineers of Great Britain.—Page 59.

New Deal advisers doubt war boom can eliminate relief rolls and unemployment.—Page 60.

Bureau of Mines starts survey of U. S. iron and steel scrap supplies.—Page 61.

Elmer F. Andrews replaced by Army officer as wage-hour law administrator.—Page 62.

15,000 workers have obtained jobs at Cleveland during past 60 days.—Page 63.

24 A.S.T.E. information sheets are issued.—Page 63C.

200 hear discussion of enameling problems at 4th annual Porcelain Institute Forum at Columbus.—Page 63D.

Industry must sell facts concerning democratic system to the public, Charles R. Hook tells hardware makers.—Page 63D.

Canadian production of iron ore resumed by Algoma Steel Corp.—Page 66.

Bids on Detroit's next housing project will cover alternate plans for light steel framing.—Page 67.

Structural steel fabricators told by Paul G. Hoffman that highway construction will be one of their biggest markets.—Page 68.

Rustless Iron & Steel Corp. buys gas generating plant.—Page 69.

Republic Steel Corp. pays \$4.50 dividend on 6 per cent preferred stock.—Page 69.

Gear manufacturers hold their semi-annual meeting at St. Joseph, Mich.—Page 70.

Monthly shipments of finished steel products by United States Steel Corp.—Page 70.

Canada to swing into war production soon. Action on U. S. Neutrality Act a factor.—Page 70A.

Cleveland welding courses, under direction of E. W. P. Smith, to resume Oct. 30.—Page 70A.

Italy is developing Albanian iron industry.—Page 70B.

Welsh tin plate industry busy.—Page 70B.

Foundries and machine shops in Texas employed 9652 men in September, 5.9 per cent below August total.—Page 70B.

Chicago chapter of AFA to open foundry exhibit at second annual conference Nov. 9-11.—Page 70B.

Duquesne Smelting Corp. (to refine non-ferrous metals and alloys) is organized at Pittsburgh.—Page 70B.

Labor Board certifies two AFL unions at Chicago Malleable Castings Co.—Page 70B.

Avoid increases in prices, Moulton tells U. S. industry.—Page 70C.

Machinists' union denies shortage of machinists, tells Government 20,000 still are idle.—Page 70C.

Pittsburgh Coke & Iron Co. to spend \$1,000,000 for enlarging ingot mold making facilities.—Page 70C.

Caterpillar Tractor Co. lifts wages 4 per cent.—Page 70C.

SWOC dues collectors hamper Heppenstall Co. operations.—Page 70C.

Carnegie-Illinois Steel Corp. to begin work soon on new power plant.—Page 70C.

Machine tool orders and inquiries have tapered some, following one of the most active machine tool buying periods in history. No let-up in the East, however, where military business predominates. A lot of foreign business still pending. Deliveries continue to advance.—Page 90.

House Committee sends out more requests for information in investigation of NLRB.

SECTIONS INDEX

| | |
|---|-----|
| Personals | 63A |
| Obituary | 63C |
| Steel Ingot Production | 71 |
| Summary of the Week | 72 |
| Comparison of Prices | 73 |
| Pittsburgh, Chicago, Cleveland, Philadelphia and New York markets | 74 |
| Fabricated Steel | 79 |
| Non-ferrous Market | 81 |
| Scrap Market and Prices | 82 |
| Finished Iron & Steel | 84 |
| Pig Iron & Raw Material Prices .. | 86 |
| Warehouse Prices | 87 |
| Plant Expansion & Equipment .. | 88 |
| Machine Tool Activity | 90 |

MEETINGS

Oct. 23 to 27—National Metal Congress, Chicago.

Oct. 24 to 26—Purchasing Agents Association of Baltimore, products exhibit, Baltimore.

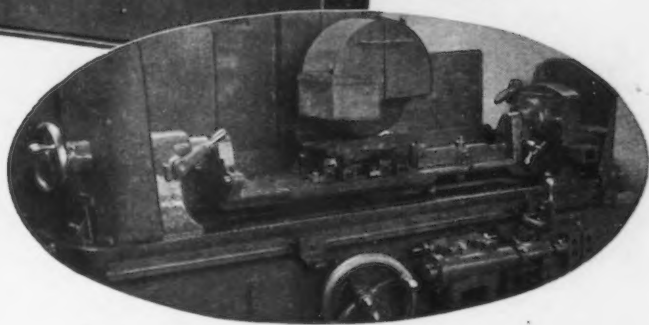
Nov. 15 and 16—National Founders Association, New York.



SAVE

"a mile a minute"

New Morgan Guide Grinder



The upper photographs show the operator making adjustments for grinding a twist guide, also details of cradle mounting with splash guard removed. Below is shown a view from the rear of the machine.

A mile of grooved section is too high a price to pay for "working in" a set of guides. Yet until now, there has been no single machine on which guides of all styles and sizes could be accurately ground.

The Morgan Construction Company has developed a new Guide Grinder to meet every requirement of this important job. It will handle guides of all types and sizes required in a rod mill. Its manual and automatic controls provide for every adjustment—up, down, backward, forward, for straight or twist guides. It is compact and self-contained—can be set anywhere.

Here is an investment in equipment that will be worth miles of rod saved to you, in improved quality of finished section.

MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS, U. S. A.

R62



LET MORGAN REMOVE THE LAGS
MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS, U. S. A.

Canadian Production of Iron Ore Resumed by Algoma Steel Corp.

TORONTO—While Canada has been exceptionally successful in the development of certain phases of its natural resources, the vast mineral deposits of the Dominion have hardly been scratched, and there are thousands of square miles from the Atlantic to the Pacific and from the United States boundary to the Arctic circle that contain minerals of almost every conceivable nature. This vast area is a virtual paradise for the prospector and one that will take many years to explore.

One branch of Canada's mining industry that is destined to become more important is the production of iron ore. At the beginning of this century Algoma Steel Corp., Sault Ste. Marie, Ont., was successful in bringing into production the Helen mine in the Michipicoten area, and during the time of its operation, some 18 years, produced 2,823,000 tons of hematite ore, before the deposit was worked out. After the Helen mine closed down, until the present year, Canada blast furnaces were forced to import their iron ore, with imports reported for 1938 totaling 2,175,000 tons, of which 65 per cent came from the United States. While the province of Ontario long has been known to contain vast deposits of iron ore, these were considered in the past of too low grade for use without first being treated to eliminate sulphur and other impurities. However, more recently large deposits of iron ore were discovered on the Belcher Island in James Bay, said to average about 60 per cent iron of bessemer grade, but in this area development and transportation costs were considered prohibitive and nothing has been done. To stimulate the exploitation and development of Ontario iron ore deposits, the Government, some 15 years ago, arranged to pay a bounty on all iron ore produced in the country of \$1 per ton, but it is only now that this bounty has acted as a stimulus to iron mining and today we have one iron mine in operation with prospects for a second before the end of next year.

After a lapse of some 20 years Algoma Steel Corp. again has come forward as a producer of iron ore, operating what is known as the New Helen mine, located a short distance from its old hematite deposit, 145 miles north of Sault Ste. Marie, on the Algoma Central Railway, also a sub-

siidiary of Algoma Steel Corp., and 12 miles in from Michipicoten Harbor at the extreme northwest corner of Lake Superior. The success of this new mining effort is due to the efforts of Sir James Dunn, president of Algoma Steel Corp., and is the result of a well thought out scheme fostered for more than two years, and one that gives Canada a substantial producer of iron ore. The execution of the plan for handling low grade ore turning it into desirable furnace feed, largely has been carried out by C. D. Kaeding & Associates, Toronto engineers.

The new Helen mine is said to contain upward of 100,000,000 tons of low grade ore, running about 35 per cent siderite, which will be put through a sintering process to burn off waste and sulphur the sinter to equal the 51.5 per cent iron ore that is standard on the United States side of Lake Superior and for years has been imported for use in Canadian steel making. The new Helen mine, at present and for several years to come will be an open cut mining operation, as it is located

on a hill that extends upwards 1732 ft. above sea level. Present ore in site and indicated is said to be sufficient to maintain present production schedules for about 150 years, and what additional tonnage may become available as development proceeds is a matter only of conjecture at this stage of the development.

The process devised for the treatment of this vast deposit of low grade siderite has no complications and while costs so far are not all that may be desired, this item is expected to improve as work progresses. At the present time upward of 2000 tons of ore daily is being broken out from the top of the second highest hill in Ontario, and is being converted into 1400 tons of sinter per day. According to Sir James Dunn, it is proposed to bring the sinter output up to 1800 to 2000 tons per day. It should be pointed out, however, that the total output of the new Helen mine will form but a minor part of the demands of the Canadian market, although it may take care of the major requirements of Algoma Steel Corp., leaving the other Ontario blast furnace operators, Steel Co. of Canada, Ltd., and the Canadian Furnace Co., to continue importations from the United States.

This Week on the Assembly Line

(CONTINUED FROM PAGE 50)

a fleet of passenger cars for use in the Panama Canal Zone from Willys-Overland Motors, Inc., comes news that Studebaker has a substantial order from the French Buying Mission for trucks. Rumor places the total at 2000 units, but possibly some other manufacturers are participating in the order.

The truck business has rosy prospects for 1940. News from Washington indicates that the War Department is drafting orders for about 12,000 motor trucks and other vehicles, largely to put the Army's new "streamlined" divisions on wheels. Something like \$15,000,000 worth of vehicles will be purchased, it is understood. Bids asked of manufacturers have April 30 as the deadline for delivery, and it is understood that even earlier delivery is being sought to assist in maneuvers being planned. Manufacturers awaited anxiously the opening of bids on Oct. 24. The purchases will include 1200 ½-ton command-reconnaissance cars; 1800 ½-ton pick-up trucks; 4000 1½-ton cargo trucks; 1150 2½-ton cargo

trucks; 125 4-ton cargo trucks and 75 7½-ton cargo trucks.

Weeks ago this column reported that the War Department was interested in buying house trailers. Now it is learned that 18 recruiting stations on wheels will be used to tour rural and suburban areas, not reached by existing recruiting efforts. These vehicles will be 18-ft. house trailers, it is learned.

While plans go ahead for reorganization hearings in Federal Court for the Auburn Automobile Co.'s subsidiary, Lycoming Mfg. Co., several hundred Lycoming engines will be built immediately under a War Department order recently issued. Nearly half of the total of new engines will be used at Wayne, Mich., where they will be installed in a fleet of two-place observation planes being built by the Stinson company.

A contract between General Motors Corp. and the Divco-Twin Truck Co. of Detroit provides that Divco is to furnish the entire 1940 requirements of Chevrolet and Yellow Truck for

delivery bodies covered by Divco patents. The bodies are to be mounted on ½-ton chassis. Production will start soon in the new Divco plant.

According to John Nicol, president of Divco, the contract represents recognition of the validity of Divco patents relating to the stand-drive and sit-down delivery vehicles. The contract is a new development in Divco's business, as the company up to now has manufactured only its own line of trucks and sold through its own dealer organization.

Manufacture of the new sealed-beam headlamps will require a new General Electric building. GE has announced that it will acquire land for a plant in Jackson, Miss. About 100,000 ft. of floor space will be constructed and 400 employees hired to make the new headlamps.

Ford Ousts Russian "Observers"

Barring of 40 or 50 Soviet engineers from the plant of the Ford Motor Co. leads to a lot of speculation but confirms persistent rumors that the visitors had been making themselves unwelcome. How did the visiting engineers get into ill-grace? Well, there are two things on the Ford properties which have been guarded very closely in the last two years and both are projects in which the Russians have been known to have more than casual interest. One of these was the Ford tractor, which naturally aroused the interest of Russians, who, even in the days of the old Fordson tractor, were more than a little interested in this type of work. The other is Ford's manufacturing processes on the cylinder sleeves which are now inserted in Mercury and many Ford V-8 engines. It has been indicated before that the Russian engineers thought these processes would mean a lot in their country. General opinion among people who understand the care exercised by Ford to guard both these projects, is that too much curiosity about the tractors and cylinder sleeves may have precipitated the ouster order.

Detroit Housing Bids to Include Steel Framing

DETROIT—When bids are asked for Detroit's next housing project, under the United States Housing Authority, and the Detroit Housing Commission, alternate plans will be complete, calling for use of light steel framing. Previously no steel framing system has ever been used on a housing project of this kind, although numerous privately financed projects,

including the one sponsored by Henry Ford near Detroit, do make use of steel framework.

Both the United States Housing Authority and the Detroit Common Council have approved an expenditure of \$15,000 for the necessary alternate plans. Previously arguments on this point in the Common Council had arisen. However, the story that the proposal for steel framing had been rejected (page 93, Sept. 28) was incorrect.

Bids for the first part of the construction work will be requested within the next 30 days and all of the underground work probably will be completed this fall and winter. Contracts for the buildings will be let in the latter part of the winter.

The project will be located at Southfield Road and Joy Road on a 160-acre tract. There will be approximately 250 buildings with 2156 dwelling units, accommodations for between 9000 and 10,000 people.



Kinnear Rolling Doors will save money in your plant, too. Get the full story on how they speed up door operation, cut maintenance and repair costs, save floor and wall space, and give smooth, dependable performance at all times -- for a long time! Write today for the complete, illustrated Kinnear catalog!

Offices and Agents In Principal Cities
The KINNEAR MANUFACTURING COMPANY
 1760-80 FIELDS AVENUE COLUMBUS, OHIO
 Factories: San Francisco, California; Columbus, Ohio

KINNEAR

ROLLING DOORS

Structural Steel Fabricators See Big Market in Highway Construction

ALTHOUGH the American Institute of Steel Construction at its annual meeting in New York last week took the position that war might have a disastrous effect on the structural steel fabricating industry, the long-range view was more hopeful, particularly in the field of construction for highway transportation. Paul G. Hoffman, president of the Studebaker Corp. and president of the Automotive Safety Foundation, who addressed a luncheon meeting on Wednesday of last week, said that the modernizing of street and highway facilities will cost not less than 50 billions of dollars, about half of which will be spent on the super highways that are needed outside the cities and the other half for modernizing street facilities within our cities.

"This 50-billion-dollar job won't be done in a day, or even a year," said Mr. Hoffman, "but will take at least 20 years." He added: "Street and highway construction is the biggest new industry on the horizon. Despite the tremendous sums involved, there is nothing fantastic about the program from a financial standpoint. Federal aid might be required for land acquisition, but existing tax rates with the

increased use of motor vehicles would provide sufficient revenue to both amortize the land costs and complete construction on a pay-as-you-go basis. One change in financial policy would be needed; namely, the elimination of diversion of the proceeds of motor taxes to other uses.

"How soon can we start on this job of providing a modern America with modern highway facilities? The answer is that we are already under way." As proof of this Mr. Hoffman cited the Holland tunnel, the West Side elevated highway, the George Washington bridge, the Hendrik Hudson and Merritt parkways in the metropolitan New York area and the fact that Chicago is considering a system of elevated highways, while plans for elevated highways for San Francisco and Los Angeles have already been drawn.

Progress in Elevated Highways

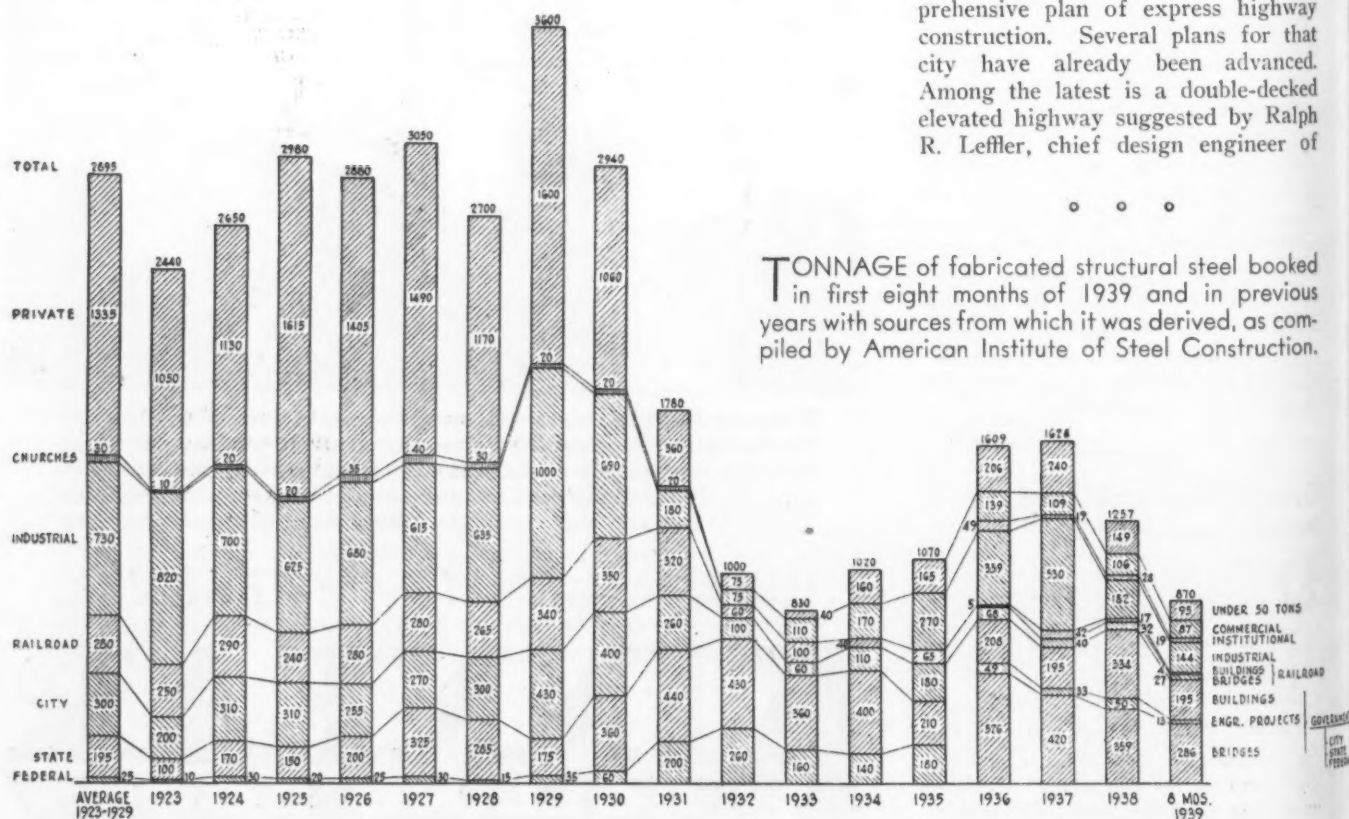
The institute's committee on elevated highways, headed by R. C. Mahon, Detroit, brought in a report which declared it to be "the duty of the institute to do everything it possibly can to develop economical and acceptable designs for elevated highways." This

committee also reported as follows on the progress that is being made by several municipalities toward solutions of traffic problems that will involve the use of steel:

"It is not our province as fabricators and erectors of elevated highways to fight the battle of the taxpayers, but we should be prepared to cooperate with those public officials charged with the task of approving express highways through congested centers. That has been done in every instance that has been brought to our attention.

"An exhibition of elevated highway designs was placed on view in Pittsburgh. A series of conferences and meetings were arranged in that city to develop a public appreciation of the traffic problem. A firm of New York engineers was employed by Pittsburgh to make a study and survey of the problem. This was done on behalf of the Pittsburgh Regional Planning Association and the engineers' report, we are informed, is now about complete. The report will go to Robert Moses, Park Commissioner of New York, who will check and draw conclusions therefrom. Mr. Moses has already done such an excellent job for the City of New York that his entrance into the Pittsburgh problem should promise an early solution.

"The State of Illinois has this year enacted bonding legislation which will enable Chicago to start upon its comprehensive plan of express highway construction. Several plans for that city have already been advanced. Among the latest is a double-decked elevated highway suggested by Ralph R. Leffler, chief design engineer of



the Chicago Sanitary District. The Chicago improvements, however, would spread over a period of years with some \$139,000,000 to be spent.

"Comprehensive plans are under consideration in Detroit, San Francisco, Los Angeles, and other cities. If Federal aid is forthcoming, and the legislation now pending in Congress would promise that, many of these projects would undoubtedly be quickly developed."

Cooperative Advertising

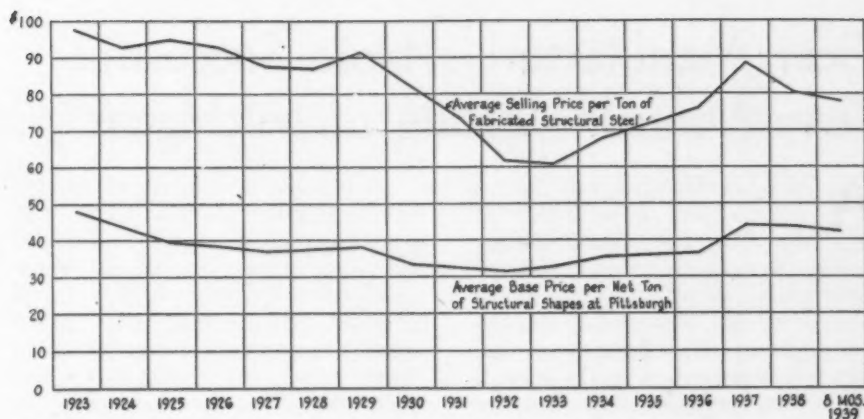
The institute's committee on public relations recommended a program of cooperative advertising whenever conditions are sufficiently encouraging to warrant the expenditure. The committee's report contained the following significant paragraph:

"We in the United States are only 7 per cent of the world's people. We own half of all the wealth in the world. We have 71 per cent of the world's automobiles, 52 per cent of its telephones and 40 per cent of its radios. In Europe we witness the outbreak of another bloody war because some of the nations claim they have not access to the world's markets. While they use bullets to obtain markets, we have, as yet, to depend only on printers' ink. Let us hope that it will never be otherwise with us."

Government Buying Still Large

In reporting on the statistics of the steel construction industry, T. H. Hendrix, director of statistics of the institute, said that an analysis showed that 57 per cent of the volume of fabricated structural steel came from Federal, state and municipal sources during the first eight months of this year against 59 per cent in all of 1938. However, private enterprise has made a slightly better showing, representing 29 per cent of the total volume in the first eight months of 1939 against 25 per cent for last year. Industrial building requirements represented 16.5 per cent this year against 14.4 per cent in 1938. Railroad buying had declined in the first eight months of this year, although railroad bridges have consumed 3.1 per cent, which is better than the record of the two previous years. Engineering projects such as dams have shown a marked decrease this year.

It was pointed out in this report that residential building has accounted for a large share of the 25 per cent gain in building construction in the first eight months of this year over the corresponding period in 1938. Gov-



THIS chart prepared by the American Institute of Steel Construction shows the spread between average base price of structural shapes and average delivered price of fabricated structural steel.

ernment financed projects gained 30 per cent this year. Further, the report said:

"Bridges, public and industrial buildings (all large users of structural steel) have shown appreciable gains and our industry has correspondingly benefited. But, for the most part, the classifications of construction which have shown the greatest increases are those in which the use of structural steel is restricted due to the nature of the work. This is especially true of residential work, likewise the large housing projects instituted by the Government, which being for the most part wall-bearing structures, do not offer a large market for our product. This is also true of water-work construction, sewage and waste disposal plants, all of which have contributed heavily to the construction volume of 1939."

Other speakers at the meetings were: E. T. Weir, chairman of National Steel Corp. and president of the American Iron and Steel Institute, whose address in part was published in *THE IRON AGE* of Oct. 19, page 95; A. D. Whiteside, president of Dun & Bradstreet, Inc., on "Competitive Practices"; Henry Wright, associate editor of the *Architectural Forum* on "When May a Renewed Demand for Urban Building Be Expected and Probable Character of Structures"; Leon Rucquoi, director of the Institute of Steel Construction of Belgium and Luxemburg, on "Experience with Welded Structures in Belgium." Reports were also presented by F. H. Frankland, chief engineer; Robert T. Brooks, executive vice-president, and V. G. Iden, secretary.

C. G. Conley Re-elected President

Clyde G. Conley of the Mount Vernon Ridge Co., Mount Vernon, Ohio,

was re-elected president by the new board of directors.

The board was reorganized by the re-election of six members whose terms of office expired this year, and by the election of three new members. The three new members are H. E. Brenchley of Minneapolis - Moline Power Implement Co., Minneapolis, Minn.; E. P. Stupp of Stupp Brothers Bridge & Iron Co., St. Louis, each to serve three years, and Thomas Leach of Leach Steel Corp., Rochester, N. Y., to serve two years.

Clyde MacCormack of Phoenixville, Pa., was elected first vice-president and Edward K. Klingelhofer of Pittsburgh, was elected second vice-president. T. R. Mullen of Allentown, Pa., was elected treasurer. All of the other officers were re-elected.

Rustless Iron Buys Gas Generating Plant

CLEVELAND—The Rustless Iron & Steel Corp., Baltimore, has recently placed a contract with the Wellman Engineering Co., Cleveland, for the engineering, designing, construction and installation of a three-unit Wellman-Galusha clean-gas generating plant with building and accessories; four Wellman gas fired ingot heating furnaces; two Wellman gas fired billet heating furnaces and a Wellman 2000-lb. floor type ingot charging and drawing machine.

Republic Pays \$4.50 Dividend

Republic Steel Corp. has declared a dividend of \$4.50 per share on its 6 per cent cumulative convertible prior preference stock, series A, payable Nov. 15, 1939, to stockholders of record Nov. 1, 1939.

Gear Manufacturers Hold Successful Semi-Annual Meeting in Michigan

A DISCUSSION of cost factors featured one of the sessions of the 22nd semi-annual meeting of the American Gear Manufacturers Association, held at St. Joseph, Mich., Oct. 16 to 18. The paper on cost determination, which drew the discussion, was presented by Paul Christensen of the Cincinnati Gear Co., and was participated in by E. S. Sawtelle, Tool Steel Gear Co.; W. L. Schneider, Falk Corp., and Howard Dingle, Cleveland Worm Gear Co. They pointed out complications, different conditions in each plant and some details of their own experience. Mr. Christensen presented a complex equation involving all the intricate cost factors which he later boiled down to a simple formula.

At the opening session on Monday, which was preceded by a short talk by Charles F. Goedke, president of the A.G.M.A., the practical and theoretical aspects of superfinishing were presented by John M. S. Hutchinson, production research department of the Chrysler Corp. While most of the material presented is familiar to readers of THE IRON AGE, Mr. Hutchinson also showed an experimental setup for superfinishing gear teeth. At the same session, U. Seth Eberhardt, Newark Gear Cutting Machine Co., related informally some experiences in the gear industry. His chief complaint was that gear buyers often failed to give the gear manufacturer sufficient information on the operating conditions to enable the conditions to be met satisfactorily. Many customers did not really know what tolerances they wanted in a gear, particularly as regards backlash.

An exhaustive analysis of modern trends in nickel steel and cast iron gear materials was given by C. M. Schwitter, of the International Nickel Co., Inc., on Tuesday morning. What must the job do, how much nickel should be present, what heat treatment should be used and what effect it has on machinability and gear life were some of the questions answered by Mr. Schwitter. At the evening dinner session, S. Wells Utley, president of the Detroit Steel Casting Co., made an address on "Industry's Contribution to Civilization." Tracing commerce and industry from the days of Tyre and Sidon, Mr. Utley directed criticism to present day Government restraint of industrial initiative. "Is there any logic to believe that Government interference will ever get us out of the depression?" he asked.

On Wednesday morning, Prof. F. A. Firestone, University of Michigan, presented "Random Thoughts About Gear Noise." He pointed out that errors in tooth contour and tooth spacing sometimes produce a periodical vibration, setting up secondary vibratory forces which may be worse than the primary noises. In the mathematical determinations of the cause and effect of vibrations, Professor Firestone pointed out how he reduces these to analogies in electric circuits. These simple schematic electric diagrams eliminate much of the need of higher mathematics. He pointed out the reflecting type of sound detector and discussed and demonstrated it. The noise at the point of origin is very small but resonance of the housing and the remainder of the machine

produces the sounds that the ear detects.

R. B. Moir of Foote Brothers commented on the unusual presentation and the advantage of having gears ground, a process which reduces the errors and lessens the noise and ultimately lowers cost. A. A. Ross of the General Electric Co. pointed out that five years ago he had no hope of being able to determine and eliminate noises but that now he is convinced that it is possible to locate noises, analyze them and eliminate a great deal of the noise.

There followed a paper on gear grinding, presented by John Dixon of the Pratt & Whitney division of Niles-Bement-Pond Co. He illustrated and described all of the various methods commonly used in grinding gears and discussed the general design of the machines and the grinding compounds used on the grinding wheels. Mr. Dixon pointed out that grinding eliminates some cost factors by permitting the use of lower priced steels and some specialized heat treatments, these factors offsetting some of the cost of grinding. S. A. Berg, of General Electric, questioned whether any distortion appeared in grinding hardened gears. Also, he pointed out that the contour of the gear tooth would be a large number of flat surfaces. This, however, does not seem to cause any increase in noise nor does it decrease the length of life of the gear. A. H. Candee of the Gleason Works pointed out the unquestionable advantage of the relieving of distortion by grinding. S. O. Bjornberg pointed out that holding methods and arbors should be given more attention than they now receive.

A number of committees also made progress reports at the meeting, and some changes were made in the association's constitution and by-laws.

MONTHLY SHIPMENTS OF FINISHED STEEL PRODUCTS BY UNITED STATES STEEL CORP.—TONS

| Month | 1935 | | 1936 | | 1937 | | 1938 | | 1939 | |
|-------------------------|-----------|----------------------|------------|----------------------|------------|----------------------|-----------|----------------------|-----------|-----------------------|
| | Shipments | Per Cent of Capacity | Shipments | Per Cent of Capacity | Shipments | Per Cent of Capacity | Shipments | Per Cent of Capacity | Shipments | *Per Cent of Capacity |
| January | 534,055 | 31.9 | 721,414 | 44.8 | 1,149,918 | 75.4 | 518,322 | 33.7 | 789,305 | 51.8 |
| February | 583,137 | 39.2 | 676,315 | 45.3 | 1,133,724 | 82.5 | 474,723 | 35.5 | 677,994 | 49.3 |
| March | 668,056 | 41.5 | 783,552 | 50.5 | 1,414,399 | 92.7 | 572,199 | 37.2 | 767,910 | 50.4 |
| April | 591,728 | 36.7 | 979,907 | 63.2 | 1,343,644 | 91.0 | 501,972 | 33.7 | 701,459 | 47.5 |
| May | 598,915 | 35.8 | 984,097 | 63.4 | 1,304,039 | 85.5 | 465,081 | 30.2 | 723,165 | 47.4 |
| June | 578,108 | 36.7 | 886,065 | 57.1 | 1,268,550 | 85.8 | 478,057 | 32.1 | 733,433 | 49.7 |
| July | 547,794 | 34.0 | 950,851 | 61.3 | 1,186,752 | 77.9 | 441,570 | 28.8 | 676,309 | 44.5 |
| August | 624,497 | 37.3 | 923,703 | 59.6 | 1,107,858 | 72.6 | 558,634 | 36.3 | 803,822 | 52.7 |
| September | 614,933 | 39.7 | 961,803 | 62.0 | 1,047,962 | 71.1 | 577,666 | 37.5 | 985,030 | 66.9 |
| October | 686,741 | 41.1 | 1,097,417 | 62.6 | 792,310 | 52.0 | 663,287 | 43.1 | ..... | ..... |
| November | 681,820 | 42.3 | 882,643 | 59.2 | 587,241 | 39.7 | 679,653 | 45.6 | ..... | ..... |
| December | 661,515 | 42.7 | 1,067,365 | 68.8 | 489,070 | 32.1 | 694,204 | 45.2 | ..... | ..... |
| Minus yearly adjustment | (—23,750) | ... | (—40,859) | ... | (—77,113) | ... | (+30,381) | ... | ..... | ... |
| Total for year | 7,347,549 | 38.1 | 10,784,273 | 58.2 | 12,748,354 | 70.4 | 6,655,749 | 36.7 | ..... | ..... |

* Annual finished steel capacity 17,940,600 gross tons, with monthly percentages based on actual number of weeks in each month.

Canada to Swing into War Production Soon

TORONTO — Preparations for carrying on a long war to attain the aims of Britain and her allies are having their effect on Canadian industrial activities and markets. While a long drawn out conflict will prove a heavy strain on Canada and other parts of the Empire, with consequences difficult to foretell, the placing of orders for munitions and supplies on the basis of a long campaign will mean expanding business for Canada and enlarged markets for her products, mineral as well as finished lines of iron and steel commodities, required for military and civilian uses.

Significant in the long term war preparations is the proposed plan to make Canada the base of the Empire's military air services, particularly for the equipping, training and maintaining of the air force, with estimated outlay of approximately \$250,000,000. This means very large expenditures on equipment and training facilities. However, the extent to which airplanes will be manufactured in Canada will depend on the action of the United States with regard to the Neutrality Act. It is reported that there are orders pending for thousands of airplanes for the British and French governments to be placed with American plants if delivery can be obtained. Should Congress fail to repeal or modify existing Neutrality legislation, it would necessitate greatly increased facilities in Canada for production of aircraft with the probability that United States manufacturers would establish plants in Canada.

The manner in which the first Canadian wartime loan for \$200,000,000 was handled by the banks indicated there will be comparatively little difficulty in raising capital for war needs and providing credits. The first loan will be employed in a large measure to redeem Canadian Government securities held in England, which have been taken over by the British Government and these funds will be available to finance British war orders.

War Contracts Expected Soon

Leaders of the Canadian steel industry express the opinion that big war contracts to be placed in Canada for the British Government will be awarded almost immediately. Since the arrival of a new group of British Gov-

ernment officials at Ottawa, there have been indications that signing of contracts is imminent. Officials of a number of Canadian companies that will be called upon to play an important part in Canada's industrial contribution to the war have had for some time a fairly close idea as to what work they will be expected to handle. Representatives of these companies have been in close contact with Canadian and British officials in Ottawa working on plans and preparations for handling orders. Contracts have been placed for new machinery, and tentative plans prepared for plant changes and improvements, but the Canadian companies are awaiting the actual signing of war contracts before going ahead with extensive and costly construction and plant changes.

War contract commitments are expected to be made almost at once and by winter the Canadian industry will swing into high gear on armament and munitions production. In the meantime, various industries adaptable to munitions production, have been operating at full time on orders for private companies which are stocking up with supplies before plants are more extensively converted to war production needs. Particularly is this true of the steel plants.

Great Britain's buying program is expected to be of a progressive nature with immediate purchases concentrated on materials most vitally needed, such as airplanes. Similarly the Canadian Government plans to build up a freight fleet, and with this idea in view contracts involving some \$40,000,000 will be placed with Canadian shipbuilders immediately. Production of armaments and munitions will be developed more gradually. One important need, however, will be for shells, and it is stated that plants prepared to handle this type of war equipment will receive contracts at once.

Must Import U. S. Steel

While the Canadian steel industry is equipped to furnish a great part of the materials that will be required under the big munitions and armament programs, it is reported that big tonnages of steel will have to be imported from the United States to take care of peace-time industrial activities as well as for some materials, such as plates

for shipbuilding, locomotives and cars. While there has been some tapering off in iron and steel sales due to the heavy orders placed for last quarter delivery a couple of months ago, it is generally believed there will be another rush of orders when books open for first quarter business. It also is anticipated that on contracts for delivery during the first three months of 1940 there will be a substantial upswing in prices, both iron and steel. Warehouse operators are moving up prices, pointing out that they are forced to import materials to take care of the heavy demand. Sheet demand from warehouses continues heavy. There is some capacity available for bars with no rush of orders. Wire and various other small lines are in good demand, with some producers booked to the year-end.

Iron Market Dull

In the merchant pig iron market business has slowed down. However, most of the larger melters are covered by contract for last quarter and shipments of iron are at the highest level for the year. It is believed that by the end of the year foundries, machine shops and other plants receiving shell and munitions orders will be running at capacity. The possibility of a shortage of pig iron under heavy war pressure has resulted in big forward delivery commitments by the large melters. Melters have not forgotten their experience in the last war and are taking steps to forestall iron shortage as far as possible.

Cleveland Welding Courses To Begin on Oct. 20

CONTINUATION of its five-day welding course in arc welding design and practice has been announced by the John Huntington Polytechnic Institute, Cleveland. The course, sponsored in collaboration with the Lincoln Electric Co., includes talks and demonstrations of welded design, as well as discussions of problems relating to welding procedures and techniques. Courses will be offered the weeks of Oct. 30, Dec. 4, Jan. 8, Feb. 12, March 25, April 22 and May 7. Sessions will be under the direction of E. W. P. Smith, welding consultant.

A.F.A. Chicago Section To Meet Nov. 9, Open New Foundry Exhibit

CHICAGO—The second annual regional conference of the Chicago chapter of the American Foundrymen's Association, which will be held Nov. 9 to 11 at the Museum of Science of Industry, Chicago, will also mark the formal opening of the museum's foundry exhibit.

The principal attraction for foundrymen in the two-story room housing the iron and steel, and foundry exhibits will be the compact, but complete working foundry on the mezzanine floor. Every phase of foundry operation from the making of the cores and molds to melting down pigs and producing gray iron castings will be faithfully shown. More than 50 companies cooperated.

Dominating the main floor of the room is an operating model of a foundry sand handling and conditioning plant supplied by National Engineering Co., Chicago. Just beyond it looms the bulk of what is said to be the first steam drop hammer ever used in the

United States, built in 1850 by James Nasmyth, English inventor of the steam drop hammer. Against one wall is a United Engineering Co. model of the Ford blooming and hot strip mill at River Rouge. Near the model rolling mill are scale models of an open hearth, a blast furnace and an ore dock, the latter showing a steamer loading. The two furnace models were supplied by Carnegie-Illinois Steel Corp., and the ore loading display by American Steel & Wire Co.

At the far end of the room opposite the entrance is an unusual display depicting progress in machine tools, in the manufacture of which castings are indispensable.

Important displays include a demonstration of gages and inter-changeability of parts, an operating model of a board drop hammer that will make lead forgings, complete with forging furnace and man-cooler, a sectionalized Ford chassis which shows the various types of castings and steels used in the frame and motor, several stands of forging samples including upset, press and drop, a display of stainless steel products and a number of operating actual size machines of various types.

NLRB Certifies Two AFL Unions at Chicago

WASHINGTON—The National Labor Relations Board has certified two AFL affiliates to represent the engineers and firemen in collective bargaining conferences with the Chicago Malleable Castings Co. of Chicago. The board certified the International Union of Operating Engineers, Local No. 399 as the representative of the engineers and the International Brotherhood of Firemen and Oilers, Local No. 7 for the firemen. Board Member Edwin S. Smith dissented from the majority.

The board has announced its approval of a stipulation entered between Westinghouse Electric & Mfg. Co., nine locals of the United Electrical Radio & Machine Workers of America, (CIO), and a board representative wherein the company, the board said, admits the propriety of nine collective bargaining units, in as many cities, covering 21,500 employees and the union's majority in each of them. It was stated that in the stipulation the parties waive any right to the holding of a hearing, thereby restricting the record to the complaint, the company's answer, and this stipulation.

The All Steel Products Mfg. Co.,

Inc., Wichita, Kan., oil tool maker, has been ordered upon charges filed by the International Association of Machinists, Local 1308, (AFL), to disestablish the All Steel Employees' Federation and to cease giving recognition to the so-called company union as the representatives of any of its employees. The board also ordered the company to cease discouraging membership in the IAM, or any labor organization of its employees, and to reinstate two men to their former positions with remuneration for lost wages.

Duquesne Smelting Corp. Organized at Pittsburgh

PITTSBURGH—Financed by local capital, a new Pittsburgh company is being organized to be known as the Duquesne Smelting Corp. Organization is being carried on by I. A. Simon, who recently resigned as vice-president, Federated Metals division, American Smelting & Refining Co.

The new company will engage in the smelting and refining of all non-ferrous metals and alloys, including the manufacture of ingot brass, ingot copper, solders, Babbitts, terne metals, and aluminum and die cast alloys.

Plants and headquarters for the new

company will be located in the Pittsburgh area but a definite selection for the plant has not yet been made although general offices have been established in the Farmers Bank Building.

For the past 25 years, Mr. Simon has directed operations of Federated Metals in the Pittsburgh district. Prior to that time he was associated with the Falks in the old Duquesne Reduction Co. which merged and became Federated Metals Corp. in June, 1924. Mr. Simon is also secretary of the Falk Foundation and vice-president of Copperweld Steel.

Initial capitalization of the new corporation will be \$1,000,000, it is said, all advanced by local business men. Mr. Simon expects the company to be producing metal within 30 days. The new company will give employment at an early date to an estimated 200 to 300 men.

Texas Foundries, Machine Shops Employ 9652

AUSTIN, TEX.—Iron and steel industries in Texas have reported to the Bureau of Business Research at the University of Texas that they employed more than 11,000 men during September. Foundries and machine shops employed 9652 men, 5.9 per cent fewer than in August but 0.9 per cent more than in September a year ago, and had aggregate weekly payrolls of \$255,400, down 16.7 per cent from August but 3.6 per cent higher than in September a year ago.

Italy Is Developing Albanian Iron Industry

LONDON—Albania is expected to produce 1,500,000 tons of iron ore before the end of 1941, according to a report submitted to Signor Mussolini by the Under-Secretary of State for Albanian Affairs. His report states that in the Lake Ocrida region an iron-bearing stratum estimated to be capable of producing 70,000,000 tons has been discovered.

Welsh Tin Plate Industry Busy

LONDON—Orders for approximately 6,000,000 boxes are now in the hands of South Wales tin plate manufacturers. Heavy sales on export account have recently been announced. Prices are advancing sharply and foreign purchasers now have to pay 8s. (\$2 at par) per standard box more than in the first half of September.

... GREAT BRITAIN ...

... Buyers awaiting new prices which will be higher

LONDON, Oct. 23 (By Cable)—Steel business in Great Britain has eased as buyers and sellers alike are awaiting new prices due to take effect Nov. 1 onward. In the meantime maximum outputs are still attained and work is heavily sold.

Higher home steel prices will be based on the principle of recouping producers' increased costs of imported raw materials, higher war risk insurance, dearer freights and other outside costs, and not to increase in expenses due to the home wartime influences. Additional receipts will go into the central fund for redistribution to producers. Increases will be possible later owing to higher home costs if other controls fail to stabilize these.

Scrap demand persists and the

Ministry of Supply is now starting a national campaign to encourage scrap recovery.

No progress has been reported regarding proposed allied steel purchases in America.

The Steel Cartel members, excluding those in German controlled territory, are keeping in touch, but it is too early in the war to realign cartel interests. The British Steel Control Board is working on an export scheme, but this must fill the broad line of Government policy, also the availability of tonnage.

The Continent reports a growing export demand, but sellers are only able to accept a part, owing to transport difficulties and rising costs in raw materials. Holland and United Kingdom are still important buyers. Official quotations are still under discussion.

Tin plate is strong with up to 30s. basis IC f.o.b. paid for export.

in the very prime of their skill and efficiency have been refused employment merely because they had reached 40 years of age."

20,000 Machinists Out Of Work, Union Says

WASHINGTON—The International Association of Machinists has addressed letters to the Secretaries of Navy and War denying that war emergency work is handicapped by lack of skilled workmen. Press statements that such shortage exists were said to be increasing in number. The union claimed that any difficulties in "bringing the men and the job together" is due to "failure of the machinery" for this purpose. The organization offered to place at the disposal of the departments its facilities to ascertain the facts and speed up efforts to remedy the situation.

"Evidence from our records indicate that there is now no shortage of trained mechanics," Emmett Davison, secretary-treasurer of the association, said. "At the present time, there are approximately 20,000 machinists, members of this union, out of employment."

It is also stated that there are waiting lists at navy yards of qualified mechanics but that these lists are not being used. On the other hand, it was stated, men are "being hired through the haphazard method known as over-the-counter." In some cases, at least, this is said to be due to an effort to induce first class machinists to accept "employment at lower ratings."

The alleged lack of "tool and die makers and similarly high-trained specialists" arises in part from the fact, Mr. Davison says, that "large numbers

\$1,000,000 Expansion for Pittsburgh Coke & Iron

PITTSBURGH—Pittsburgh Coke & Iron Co. will soon spend approximately \$1,000,000 for constructing additions and extensions to the company's Neville Island plants. The company has filed a registration statement with the SEC for the registration of \$750,000 additional first mortgage bonds, and several thousand shares of preferred and common stocks. Proceeds from the sale of the bonds, together with other funds of the company, will be used in the construction project, the major portion of which will involve the installation of ingot mold making facilities.

Work on New C-I Power Plant to Begin Soon

PITTSBURGH—Carnegie-Illinois Steel Corp. is expected soon to begin work on a new 32,000 kw. power plant to be located at its Carrie Works, Rankin, Pa. Stone & Webster, New York, is designing the plant which is to supplement the present 25-cycle power line existent in the Monongahela Valley plants. This project is an additional phase of the U. S. Steel Corp.'s long range power plant for its Pittsburgh district subsidiary plants.

Avoid Increases In Prices, Moulton Tells U. S. Industry

INDUSTRY was urged last week by Dr. Harold G. Moulton, president, Brookings Institution, to "resist to the utmost" advances in prices at this time.

"The economic goal of the United States at this difficult and uncertain period should be to make full utilization of our productive resources in expanding production without permitting a general inflation of prices and destruction of equilibrium," Doctor Moulton said at a luncheon given by Alfred P. Sloan, Jr., in New York.

While the economic situation in this country appears highly promising, at least on the surface, sober reflection warns of lurking dangers, the economist said. He continued:

"Are we not stocking up with inventories and expanding production schedules at too rapid a pace? What if the war should end suddenly? Even if this proves to be of long duration, what will be the ultimate repercussions upon this country? Are we not even now riding the wind and promoting a business boom, with the familiar distortion of prices, wages and other cost factors?"

Republic Gadsden Payroll Sets All-Time Record

BIRMINGHAM—The employment rolls of the Gadsden works of the Republic Steel Corp. are the largest in the plant's history, totaling more than 3700. The Tennessee Coal, Iron & Railroad Co. has more than 23,000 employed.

Caterpillar Pay Increases

CHICAGO—The Caterpillar Tractor Co., Peoria, Ill., has granted all hourly pay roll employees a 4 per cent wage increase. This will be held in trust by the company to provide each worker with two weeks' vacation with pay, or to provide a severance bonus for all employees leaving the employ of the company prior to vacation.

SWOC Dues Collectors Busy

PITTSBURGH—Operations at the Heppenstall Co. were partially held up recently due to an SWOC dues collecting campaign.

SWOC Drive for Closed Shop Seen by Pittsburgh Mills

PITTSBURGH — Observers here this week saw indications that the Steel Workers Organizing Committee, an affiliate of John L. Lewis' CIO, is opening a drive for a modified closed shop and the check-off of dues in the steel industry.

Small steel fabricating companies in western Pennsylvania are being approached by SWOC representatives with an agreement which brings up issues similar to those involved in the Chrysler strike.

This week western Pennsylvania industrialists were studying the new SWOC proposal which supplements the standard labor contract with the belief that it may violate the Wagner Act. SWOC headquarters here refused to affirm or deny that it was offering the new agreement to small companies, in the expectation of making similar demands later on the larger steel companies.

A copy of the SWOC supplementary agreement which is making the rounds of Pittsburgh district plants follow:

AGREEMENT

This agreement dated 1939, between the (name of company) hereinafter referred to as the "corporation" and the Steel Workers Organizing Committee on behalf of the members of the Amalgamated Association of Iron, Steel and Tin Workers of North America, hereinafter referred to as the "union" employed by the corporation. The corporation and the union parties to this agreement being also parties to the agreements of . . . (here reference is made to the standard agreement signed by the company and the union).

Now, therefore, in order to promote industrial welfare and encourage harmonious relations between the corporation and its employees, the corporation makes this statement of its labor policies with respect to its employees at its plant at (name of town), Pennsylvania, it being understood that the term "employee" as used in this statement, shall not include foremen, assistant foremen or supervisors in charge of any classes of labor, or watchmen or any salaried employee.

1. The corporation believes that its interests and the interests of its employees would be better served if all of the employees were members of the union.

2. The corporation, as a matter of policy, will endeavor to persuade its

employees at the (name of plant) to become members of the union.

3. If at any time the union shall furnish to the corporation a list of employees in the said plant who aren't members of the union, the corporation agrees to advise such employees of the corporation's policy and to tell them to join the union.

4. The corporation believes that those of its employees who are members of the union should pay their dues, and if the union furnishes the corporation with a list of union members who are delinquent, the corporation will endeavor to persuade such employee to pay his dues.

5. If at any time the union feels that the objectives of this declaration of policy are not being adequately accomplished, the corporation agrees to consult with the proper officials of the union, with reference to ways and means of better accomplishing the objectives indicated in this agreement.

(Signed)

Steel Workers Organizing Committee.

Name of corporation.

Steel Wage Case Is Back for Rehearing

WASHINGTON — The Walsh-Healey steel wage case was back in the hands of the Federal District Court for the District of Columbia for rehearing this week, after counsel for the Government had failed to ask the Circuit of Appeals to stay the mandate. Failure to petition the court may or may not be significant but it is contrary to the procedure usually followed when an appeal to the Supreme Court is planned.

Government counsel still has 60 days in which to petition the Supreme Court on a writ of certiorari and while the Justice and Labor Departments have definitely decided to appeal to the high court there is no indication as to when the writ will be filed. There were some intimations that the interests of the War, Navy and Treasury

Departments, centering around the fear that the decision gives an unprecedented standing in court to prospective bidders, may be responsible for the delay.

These big three in the field of Government buying are expected to take an active part in the appeal in view of the implications of the decision which, as explained in THE IRON AGE for Oct. 19, page 80, conceivably go far beyond the issues involving the Walsh-Healey Act.

Foundry Equipment Buying Reaches 23-Month Peak

PURCHASES of foundry equipment in September were the heaviest in 23 months, according to the index of orders compiled by Foundry Equipment Manufacturers Association. The association reports that new orders in September were at the rate of 184.4 per cent of the 1922-24 average, as compared with 131.4 in the preceding month and 78.7 in September, a year ago. The September figure is the highest since October, 1937, when the index stood at 185. The three months' average of orders in September stood at 143.3, the highest position since November, 1937, and comparing with 79.1 a year ago.

Nash Strike Settled

KENOSHA, WIS.—Nash Motors and UAW officials last week settled a strike which had tied up operations at the Nash plant here and the Seaman body plant at Milwaukee, since Oct. 1. About 6100 employees returned to work at the two plants Monday morning. Wages were lifted 5c an hr.

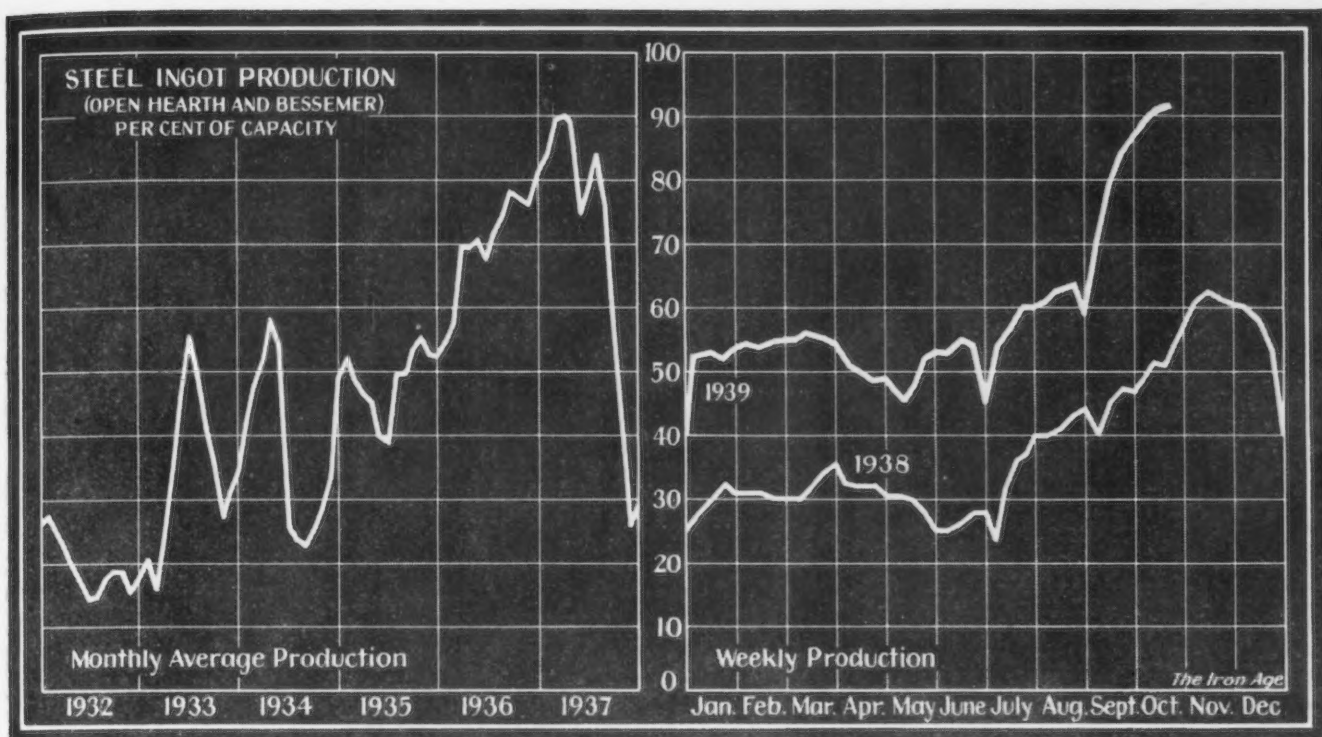
Steel Company Earnings Gain in Third Quarter

MOST steel companies reported improved earnings during the third quarter of 1939. Among those releasing income statements during the past week were:

| | 3rd Quar., 1939 | 2nd Quar., 1939 | 3rd Quar., 1938 |
|----------------------------------|--------------------|--------------------|--------------------|
| Youngstown Sheet & Tube Co. | \$765,065 | \$329,086 | \$727,546* |
| Sharon Steel Corp. | 58,483* | ..... | 19,065* |
| Keystone Steel & Wire Co. | 273,992 | 380,738 | 83,224 |
| Continental Steel Corp. | 198,138 | 253,128 | 192,360 |
| Sloss Sheffield S. & I. Co. | 198,232 | ..... | 42,615 |
| Acme Steel Co. | 443,184 | 259,969 | 110,007 |
| Rustless Iron & Steel Corp. | 262,045 | 225,185 | 18,933 |
| Cleveland Cliffs Iron Co. | 1,505,505 | ..... | 329,820 |
| Inlake Iron Co. | 311,385* | ..... | 452,018* |

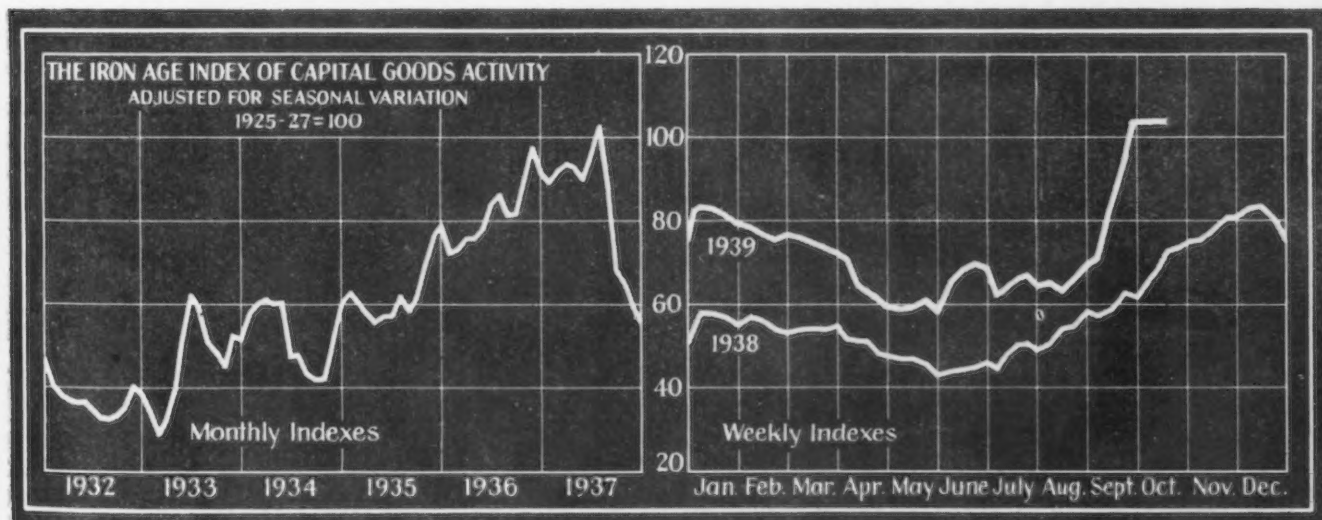
*Loss.

Ingot Rate Gains Another Point to 92% of Capacity



| | | Pitts- burgh | Chicago | Valleys | Phila- delphia | Cleve- land | Buffalo | Wheel- ing | Detroit | Southern | S. Ohio River | Western | St. Louis | East- ern | Aggre- gate |
|---|-----------------|-----------------|---------|---------|-------------------|----------------|---------|---------------|---------|----------|------------------|---------|-----------|--------------|----------------|
| District Ingot Production, Per Cent of Capacity | CURRENT WEEK.. | 91.0 | 89.5 | 95.0 | 79.0 | 91.0 | 87.0 | 92.0 | 100.0 | 90.0 | 86.5 | 90.0 | 83.0 | 95.0 | 92.0 |
| | PREVIOUS WEEK.. | 90.0 | 89.0 | 94.0 | 77.0 | 90.0 | 92.0 | 92.0 | 100.0 | 90.0 | 86.5 | 75.0 | 79.5 | 70.0 | 91.0 |

Auto Strike Retards Progress of Capital Goods Index



WHILE the pace of operations in the heavy industries showed a further increase in the past week, THE IRON AGE index of activity in that field remained practically unchanged from the preceding week due to the loss in assemblies of automobiles, a development directly traceable to the Chrysler labor strike. The week's loss in the automobile index was sufficient to overcome the combined gains of the other components to the extent that the combined index ended the week at 101.5, as compared with 101.4 in the previous week. The construction of large structures by private funds continues to improve, particularly in comparison with a year ago. The past week's volume of contracts for such purposes was \$17,693,000, the sixth consecutive week which has shown an increase over

the 1938 week. The past week also marked the first time this year's cumulative total of private construction awards passed the total of the comparable period of 1938.

| | Week Ended Oct. 21 | Week Ended Oct. 14 | Comparable Week | |
|--|--------------------|--------------------|-----------------|-------|
| | | | 1938 | 1929 |
| Steel ingot production ¹ | 129.3 | 126.8 | 71.4 | 114.2 |
| Automobile production ² | 125.7 | 138.0 | 96.4 | 122.0 |
| Construction contracts ³ | 74.4 | 72.0 | 77.2 | 105.1 |
| Forest products carloadings ⁴ | 69.7 | 66.5 | 59.3 | 117.7 |
| Production and shipments, Pittsburgh District ⁵ | 108.3 | 103.5 | 61.8 | 116.5 |
| Combined index | 101.5 | 101.4 | 73.2 | 115.1 |

Sources: 1. THE IRON AGE; 2. Ward's Automotive Reports; 3. Engineering News-Record; 4. Association of American Railroads; 5. University of Pittsburgh.

... SUMMARY OF THE WEEK ...

... Mill backlogs for first quarter being built up.

o o o

... Steel trade sees no excessive consumer inventory situation yet.

o o o

... Ingot rate higher at 92 per cent; scrap prices tending to harden again.

THERE are evidences in some steel products of a secondary buying wave, which, while lacking the rush of last month, is building up fairly large backlogs on mill books for first quarter shipment, particularly in sheets and strip. Most of the current business is coming to the mills unsolicited, consumers and distributors trying to assure themselves a supply of steel during the first quarter. Announcement of first quarter prices in the near future probably will be followed by further buying as some consumers are loath to make commitments at an unknown price.

The fears expressed in Washington and in other quarters that excessive inventories of steel are being built up in the hands of consumers and distributors are not yet shared by the steel companies, which are being virtually hounded by customers for quicker shipments. Buyers are flocking to general sales headquarters to bring added pressure to bear for a speeding up of shipments. It is not doubted in steel circles that some of the tonnage on their books represents speculative buying, but for the present at least the bulk of steel production is going rapidly into consumption, with the probability that steel users will not be able to accumulate much inventory before the first quarter.

If an easier situation should develop at that time in domestic trade, some of the slack would perhaps be taken up by exports, in which there is a large unsatisfied demand. Steel exporters are now selling for shipment in the first quarter, in some instances on the basis of the domestic prices in effect at that time, a practice more unusual in export trade than in domestic business. American steel companies thus far have been barely able to take care of the requirements of their own agents abroad, let alone the demand that has come here from former customers of European nations.

Only 25,000 tons of the 200,000 tons of semi-finished steel that Great Britain sought in the United States

has thus far been purchased here, and negotiations for additional tonnage may shortly be resumed. Meanwhile, fairly heavy shipments of pig iron to England have been going out for some weeks, purchases in the United States since the outbreak of war having totaled at least 100,000 tons. Canada is beginning to draw upon American mills for increasing amounts of steel for her railroad program, while further orders will be placed here for shipbuilding and munitions work. If the arms embargo is repealed, a considerable part of the work that might otherwise be done in Canada will come to the United States. Large British and French airplane contracts are awaiting action in Congress.

Belgian industry will look to the United States for pig iron to keep its plants going in view of the fact that its blast furnaces no longer can obtain sufficient iron ore from France. Inquiries from Belgium have already been received here.

WHILE the present prospects seem to assure a high rate of steel operations over the remainder of the year, it does not necessarily follow that operations of 90 per cent or better are assured through the first quarter. Steel companies are resigned to the possibility that first quarter production may fall moderately below that of this quarter because of the relaxing of some of the present urgency, as for example in railroad steel, the demand for which has seriously complicated steel production and delivery problems.

THE IRON AGE estimates ingot production for the current week at 92 per cent, up one point over last week. Only at Buffalo, where some open-hearth furnaces have been taken off temporarily for repairs, is there a letdown; in other districts operations are either at last week's level or higher. The Pittsburgh rate is 92 per cent, within two points of the 1937 peak, while further moderate gains have been made at Chicago, Youngstown, Cleveland, St. Louis and in eastern Pennsylvania and New England. Many individual plants are working at full capacity. Additional blast furnaces are being brought into service and others are being made ready.

Scrap markets, which have undergone a reaction during the past two weeks, appear to be back on a more solid basis. Prices are higher in some districts and lower in others. The net result as reflected by THE IRON AGE composite of steel scrap is a decline of only 12½c. as compared with one of \$1.08 in the preceding week. Mills are staying out of the market for the present, but the high production of ingots will force them to seek fresh supplies before long.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

| Per Gross Ton: | Oct. 24, 1939 | Oct. 17, 1939 | Sept. 26, 1939 | Oct. 25, *1938 |
|--|---------------|---------------|----------------|----------------|
| Rails, heavy, at mill | \$40.00 | \$40.00 | \$40.00 | \$40.00 |
| Light rails: Pittsburgh, Chicago, Birmingham | 40.00 | 40.00 | 40.00 | 40.00 |
| Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point | 34.00 | 34.00 | 34.00 | 34.00 |
| Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point | 34.00 | 34.00 | 34.00 | 34.00 |
| Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point | 34.00 | 34.00 | 34.00 | 34.00 |
| Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham | 40.00 | 40.00 | 40.00 | 40.00 |
| Wire rods: Nos. 4 and 5, Pittsburgh, Chicago, Cleveland | 43.00 | 43.00 | 43.00 | 43.00 |
| Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb. | 1.90 | 1.90 | 1.90 | 1.90 |

Finished Steel

| Cents Per Lb.: | | | | |
|---|------|------|------|------|
| Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham | 2.15 | 2.15 | 2.15 | 2.25 |
| Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont | 2.10 | 2.10 | 2.10 | 2.10 |
| Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham .. | 2.10 | 2.10 | 2.10 | 2.10 |
| Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary | 2.65 | 2.65 | 2.65 | 2.70 |
| Alloy bars: Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton | 2.70 | 2.70 | 2.70 | 2.80 |
| Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham | 2.00 | 2.00 | 2.00 | 2.15 |
| Cold rolled strip: Pittsburgh, Cleveland, Youngstown .. | 2.80 | 2.80 | 2.80 | 2.95 |
| Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham .. | 3.50 | 3.50 | 3.50 | 3.50 |
| Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown .. | 2.00 | 2.00 | 2.00 | 2.15 |
| Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown | 3.05 | 3.05 | 3.05 | 3.20 |

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

| Cents Per Lb.: | Oct. 24, 1939 | Oct. 17, 1939 | Sept. 26, 1939 | Oct. 25, *1938 |
|--|---------------|---------------|----------------|----------------|
| Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham | 2.55 | 2.55 | 2.40 | 2.45 |
| Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham | 2.60 | 2.60 | 2.60 | 2.60 |
| Barbed wire, galv.: Pittsburgh, Chicago, Cleveland, Birmingham | †3.40 | 3.40 | 3.25 | 3.20 |
| Tin plate, 100 lb. base box: Pittsburgh and Gary | \$5.00 | \$5.00 | \$5.00 | †\$5.35 |

*Pittsburgh prices only.
†Applies to 80-rod spools only.
‡Subject to post-season adjustment.

Pig Iron

| Per Gross Ton: | | | | |
|--------------------------------------|---------|---------|---------|---------|
| No. 2 fdy., Philadelphia ... | \$24.84 | \$24.84 | \$24.84 | \$22.84 |
| No. 2, Valley furnace | 23.00 | 23.00 | 23.00 | 21.00 |
| No. 2, Southern Cin'ti | 23.06 | 23.06 | 23.06 | 21.06 |
| No. 2, Birmingham | 19.38 | 19.38 | 19.38 | 17.38 |
| No. 2, foundry, Chicago† ... | 23.00 | 23.00 | 23.00 | 21.00 |
| Basic, del'd eastern Pa. | 24.34 | 24.34 | 24.34 | 22.34 |
| Basic, Valley furnace | 22.50 | 22.50 | 22.50 | 20.50 |
| Malleable, Chicago† | 23.00 | 23.00 | 23.00 | 21.00 |
| Malleable, Valley | 23.00 | 23.00 | 23.00 | 21.00 |
| L. S. charcoal, Chicago | 30.34 | 30.34 | 30.34 | 28.34 |
| Ferromanganese, seab'd carlots | 100.00 | 100.00 | 100.00 | 92.50 |

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

| Per Gross Ton: | | | | |
|--------------------------------|---------|---------|---------|---------|
| Heavy melting steel, P'gh... | \$22.50 | \$22.50 | \$23.25 | \$14.75 |
| Heavy melting steel, Phila... | 21.75 | 22.25 | 22.50 | 14.75 |
| Heavy melting steel, Ch'go... | 18.375 | 18.25 | 19.25 | 13.00 |
| Carwheels, Chicago | 17.75 | 17.50 | 17.75 | 13.25 |
| Carwheels, Philadelphia ... | 22.25 | 22.25 | 20.50 | 16.75 |
| No. 1 cast, Pittsburgh | 22.75 | 22.75 | 21.25 | 15.50 |
| No. 1 cast, Philadelphia ... | 24.25 | 24.25 | 22.50 | 16.75 |
| No. 1 cast, Ch'go (net ton) .. | 16.25 | 16.25 | 17.75 | 12.25 |

Coke, Connellsville

| Per Net Ton at Oven: | | | | |
|----------------------------|--------|--------|--------|--------|
| Furnace coke, prompt | \$5.00 | \$5.00 | \$4.75 | \$3.75 |
| Foundry coke, prompt | 5.75 | 5.75 | 5.50 | 4.75 |

Non-Ferrous Metals

| Cents per Lb. to Large Buyers: | | | | |
|--------------------------------|---------|---------|---------|--------|
| Copper, Electrolytic, Conn... | 12.50 | 12.50 | 12.00 | 11.25 |
| Copper, Lake, New York ... | 12.50 | 12.50 | 12.125 | 11.375 |
| Tin (Straits), New York... | **50.50 | **55.00 | **70.00 | 46.50 |
| Zinc, East St. Louis | 6.50 | 6.50 | 6.25 | 5.05 |
| Zinc, New York | 6.89 | 6.89 | 6.64 | 5.44 |
| Lead, St. Louis | 5.35 | 5.35 | 5.35 | 4.95 |
| Lead, New York | 5.50 | 5.50 | 5.50 | 5.10 |
| Antimony (Asiatic), N. Y... | 14.00 | 14.00 | 14.00 | 14.00 |

**Nominal.

The Iron Age Composite Prices

Finished Steel

Oct. 24, 1939
One week ago
One month ago
One year ago

| | |
|---------------|--|
| 2.236c. a Lb. | |
| 2.236 | |
| 2.236 | |
| 2.236 | |

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

| High | Low |
|--|-----|
| 1939..... 2.286c., Jan. 3; 2.236c., May 16 | |
| 1938..... 2.512c., May 17; 2.211c., Oct. 18 | |
| 1937..... 2.512c., Mar. 9; 2.249c., Jan. 4 | |
| 1936..... 2.249c., Dec. 23; 2.016c., Mar. 10 | |
| 1935..... 2.062c., Oct. 1; 2.056c., Jan. 8 | |
| 1934..... 2.118c., Apr. 24; 1.945c., Jan. 2 | |
| 1933..... 1.953c., Oct. 3; 1.792c., May 2 | |
| 1932..... 1.915c., Sept. 6; 1.870c., Mar. 15 | |
| 1931..... 1.981c., Jan. 13; 1.883c., Dec. 29 | |
| 1930..... 2.192c., Jan. 7; 1.962c., Dec. 9 | |
| 1929..... 2.223c., Apr. 2; 2.192c., Oct. 29 | |
| 1928..... 2.192c., Dec. 11; 2.142c., July 10 | |

Pig Iron

| |
|---------------------|
| \$22.61 a Gross Ton |
| 22.61 |
| 22.61 |
| 20.61 |

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

| High | Low |
|--------------------------------------|-----|
| \$22.61, Sept. 19; \$20.61, Sept. 12 | |
| 23.25, June 21; 19.61, July 6 | |
| 23.25, Mar. 9; 20.25, Feb. 16 | |
| 19.73, Nov. 24; 18.73, Aug. 11 | |
| 18.84, Nov. 5; 17.83, May 14 | |
| 17.90, May 1; 16.90, Jan. 27 | |
| 16.90, Dec. 5; 13.56, Jan. 3 | |
| 14.81, Jan. 5; 13.56, Dec. 6 | |
| 15.90, Jan. 6; 14.79, Dec. 15 | |
| 18.21, Jan. 7; 15.90, Dec. 16 | |
| 18.71, May 14; 18.21, Dec. 17 | |
| 18.59, Nov. 27; 17.04, July 24 | |

Steel Scrap

| |
|----------------------|
| \$20.875 a Gross Ton |
| 21.00 |
| 21.67 |
| 14.17 |

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

| High | Low |
|----------------------------------|-----|
| \$22.50, Oct. 3; \$14.08, May 16 | |
| 15.00, Nov. 22; 11.00, June 7 | |
| 21.92, Mar. 30; 12.92, Nov. 10 | |
| 17.75, Dec. 21; 12.67, June 9 | |
| 13.42, Dec. 10; 10.33, Apr. 29 | |
| 13.00, Mar. 13; 9.50, Sept. 25 | |
| 12.25, Aug. 8; 6.75, Jan. 3 | |
| 8.50, Jan. 12; 6.43, July 5 | |
| 11.33, Jan. 6; 8.50, Dec. 29 | |
| 15.00, Feb. 18; 11.25, Dec. 9 | |
| 17.58, Jan. 29; 14.08, Dec. 3 | |
| 16.50, Dec. 31; 13.08, July 9 | |

... THIS WEEK'S MARKET NEWS ...

NEW BUSINESS

... Current bookings are largely for fourth quarter delivery

WITHOUT the fanfare present a month ago, steel consumers are now placing a substantial volume of business for shipment at mills' convenience on basis of price at time of shipment. This movement, which is expected to grow, is a direct result of the difficulty some consumers are experiencing in obtaining steel supplies at the present time. Customers reason that if delayed deliveries continue it would be wise to "get on the books" for early 1940 shipments regardless of price. The belief that such price advances will be moderate has also removed some hesitation toward placing additional forward commitments.

The largest single factor contributing to steel shortages is the sharp increase in railroad buying. The steel to be shipped to the railroads before next spring is equivalent to 2,400,000 tons of ingots. This amount of steel will be required to manufacture over 55,000 freight cars (over 40,000 have already been ordered since Sept. 1 and 15,000 more are expected) and approximately 1,000,000 tons of rails. The sharp increase in tin plate demand has also been a factor in the present tight delivery situation.

New steel business has tapered at CLEVELAND since Oct. 10. Most consumers apparently are reasonably assured of their steel supply for the remainder of this year and are convinced price action will be prudent and in conformity with actual necessity.

Present backlogs assure high operations well into first quarter. Pressure for shipments encountered by steel sellers indicates consumers are producing at close to the rate at which they are obtaining steel, although below the amount of steel they have placed on order.

The volume of new business being received in the CHICAGO district is little changed from a week ago. The trend, if anything, is downward. One sales office, which is currently running about 60 per cent behind the same period last month, is from 10 to 12 per cent under last week. In other offices, however, the decline is not so noticeable. A good deal of the present tonnage consists of orders against com-

mitments previously made for delivery this quarter, the remainder, of course, being for 1940 delivery at price then prevailing.

Production and delivery problems are giving mills many headaches to day. In CHICAGO, productive units, with few exceptions, are standing the strenuous pace very well. All mills but one there are now operating for the second consecutive week at over 100 per cent. In some cases pig iron stocks are being depleted for steel making, blast furnace capacity being insufficient to keep up with such high open-hearth activity.

One of the greatest pressure spots as concerns steel delivery is the railroad car building shops around CHICAGO. Demand from the carriers themselves is so intense for new rolling stock that the car shops have no alternative but to press the mills for the needed material.

CHICAGO district figures on September activity in steel and malleable castings reveal an increase in orders of 155 per cent over August and 270 per cent over a year ago in steel, and 76 per cent over August and 131 per cent over a year ago in malleable. Steel castings shipments in September were only 1/2 per cent higher than in August but were 64 per cent above 1938, while malleable shipments showed a 2 per cent increase over August and a 38 per cent gain over the previous year.

Chief interest of consumers in the East at present is in obtaining coverage on first quarter requirements. A considerable tonnage of flat rolled products and hot rolled bars has been booked for delivery in this period. While the larger mills are booked solid on most products through the present quarter, it is still possible to obtain deliveries on tubular goods, cold finished bars and certain specialty items in the current period.

Considerable export plate demand from South America and the Scandinavian countries is developing, but the press of domestic business prevents most mills from accommodating this foreign demand. The bulk of these inquiries range between 100 and 300 tons, but some proposals have covered lots up to 10,000 tons. Mild steel plates are receiving the heaviest call, followed by ship material. There have been some small lots of this type of business accepted, but apparently the

surface has not yet been scratched. About 1000 tons of the steel required for the locomotives being built for the Canadian Government has been placed with an Eastern mill.

PRICES

... Moderate advances expected by the trade

REGARDLESS of New Deal "pressure" for a status quo in the present steel price structure, it is expected that producers will be forced to offset rising steel costs, at least partially, by moderate advances in steel prices on major products. A \$2 to \$3 advance is indicated and would not be surprising. The timing of such advances, however, remains obscure.

PIG IRON

... New domestic buying light but shipments are heavy ... Export trade expected to gain

ALTHOUGH current domestic buying of pig iron is not large, the volume of shipments against contracts on the books is very heavy in nearly all districts. For example, it is reported from CLEVELAND that October deliveries probably will run 20 per cent over those of September, which showed a substantial gain over August. EASTERN PENNSYLVANIA producers have had to resort to a modified allotment procedure to satisfy the requirements of all customers. While Chicago district shipments are about 25 per cent ahead of those in September.

In addition to the large domestic shipments the export market is becoming more active. Shipments of iron to Great Britain are going forward in good volume. It is understood that Britain's orders placed here since the outbreak of the war total at least 100,000 tons. On top of this is the prospect of a large demand from Belgium, which is now inquiring in this market. A report to the Department of Commerce from the American commercial attaché in Brussels points out that at present all of the ore mined in eastern France, where Belgium steel plants get the bulk of their ore, is being allocated to specified companies in France, and consumers in other countries are having difficulty getting their orders filled. Reports are current in Belgium that France plans to reduce iron ore ex-

ports to Belgium to half the usual volume. The Commerce Department report adds that, if the Belgian steel industry is to be kept active during the present crisis, pig iron will have to be purchased abroad, perhaps largely from the United States as was done in 1918 before the reconstruction of Belgian blast furnaces.

Fresh inquiries for iron have also come from Scandinavian countries. Demand from Canada is expected as soon as the Dominion authorities have placed war contracts.

New England foundries are reported to be operating at about 75 per cent of capacity. In the Central West a large part of current consumption is in plants making castings for machine tools, railroads, automobiles, farm machinery and implements and armaments.

Carnegie-Illinois Steel Corp. is blowing in an additional furnace at its Edgar Thomson works, Braddock, Pa. The Alan Wood Steel Co. has put its second furnace in blast at Swedeland, Pa.

STEEL OPERATIONS

... Ingot rate for industry advances one point to 92%

THE IRON AGE estimates ingot production for the current week at 92 per cent of the industry's capacity, one point higher than last week. Only at BUFFALO has a decline occurred, the Bethlehem Steel Co. having taken off four open-hearth furnaces for repairs, reducing the district rate to 87 per cent from 92 per cent last week, but some of this capacity will be active again by the end of the week.

In all other districts there have been either gains or a continuance of last week's rates. The PITTSBURGH district is up two points to 92 per cent, YOUNGSTOWN is up one point to 95 per cent, CLEVELAND-LORAIN has also gained a point to 91 per cent, EASTERN PENNSYLVANIA is two points higher at 79 per cent, while operations in the St. Louis and NEW ENGLAND districts have gained sharply. The DETROIT district continues to operate at 100 per cent. In the CHICAGO district all mills but one are operating at practical capacity.

While minor setbacks are to be expected in some districts because of open-hearth furnace repairs or for other reasons, there is a good chance that the rate for the entire country will go higher. For example, a CHI-

CAGO plant will be able to operate at a higher rate as soon as it can get into service an additional blast furnace, now undergoing repairs. EASTERN PENNSYLVANIA plate mills, which have not been operating at full capacity, are getting an increased amount of business and operations there may go higher.

RAILROAD BUYING

RELIABLE sources indicate that since Sept. 1 approximately 40,000 freight cars have been ordered and are either to be built by car builders or by individual railroad shops. It is believed that at least 15,000 additional freight cars will have been booked by the end of this year. On the basis of these estimates, it would appear that 1939 will probably wind up as a 65,000 freight car year or possibly more, which would include those cars ordered prior to Sept. 1. In 1936 slightly over 67,000 freight cars were ordered while in 1929 over 111,000 cars were purchased.

Equipment Orders and Inquiries

Chicago & Great Western has purchased 100 flat cars from Pullman Standard Car Mfg. Co.

Northern Pacific has ordered 1300 freight cars distributed as follows: 500 box and 150 hopper cars to American Car & Foundry Co., 500 box to Pullman Standard Car Mfg. Co., and 150 hopper cars to General American Transportation Corp. Total steel requirements will approximate 15,000 tons.

The Baltimore & Ohio Railroad has ordered 500 70-ton gondola cars from American Car & Foundry and it is understood that it has also purchased 1000 50-ton hopper cars from Bethlehem Steel Co. Steel requirements for these cars approximate 22,000 tons. The Baltimore & Ohio has yet to place 500 box cars.

Louisiana & Arkansas has bought 200 box cars from American Car & Foundry Co.

The Maine Central has ordered 10 covered hopper cars from American Car & Foundry Co.

The Tennessee Central has ordered 65 hopper cars from American Car & Foundry.

The Union Pacific is taking bids on 500 to 1000 ballast cars which will require from 7500 to 15,000 tons of steel.

Norfolk & Western is seeking bids on 1000 hopper cars. This is in addition to 3500 cars previously purchased.

Minneapolis, Northfield & Southern is inquiring for three diesel-electric locomotives.

Sorocabana Railway of Brazil has ordered four locomotives from American Locomotive Co.

Texas & Pacific will purchase 500 box cars.

American Car & Foundry Co. has received orders for 32 freight cars from the Navy Department.

The Minneapolis & St. Louis is planning a \$1,210,000 improvement program, to include rails, the rebuilding of freight cars and the improvement of locomotives.

Louisville & Nashville has applied for authority to issue \$2,025,000 in equipment trust certificates to finance the purchase of 1200 steel hopper coal cars costing \$2,717,694. Pullman-Standard Car Mfg. Co., and American Car & Foundry Co., each will build 600 cars. (Placing of this business reported in issue of Oct. 19.)

The St. Louis-Southwestern Railway has been granted authority by the Federal Court at St. Louis to buy the necessary materials to construct the following: 100 general service coal cars to cost \$253,500; 50 steel flat cars, \$51,000; 6 flat cars, \$7,538; 12 steel cabooses \$27,020, and 50 50-foot automobile cars \$162,600. (Notice of intention to file application noted in Oct. 19 issue.)

Trustees of the Chicago, Milwaukee & St. Paul & Pacific Railroad have been granted ICC authority to issue \$5,080,000 worth of 2½ per cent trust certificates, the proceeds of which would be used to help finance the purchase of 2000 all-steel, wood-lined box cars of 50-ton capacity and 10 steam locomotives, at an estimated cost of \$6,350,000. The locomotives will be built by the Baldwin Locomotive Works and the cars will be built in the railroad's own shops.

Rails and Accessories

Taking into consideration the 50,000 to 60,000 tons of rails which the New York Central lines are expected to purchase, approximately 1,000,000 tons of rails have been ordered since Sept. 1. This fall's rail buying program is about completed and only minor tonnages can be expected in the near future. All business has been taken subject to shipment at mill's convenience.

Spokane, Portland & Seattle Railway has placed 10,000 tons of 112-lb. rail with Colorado Fuel & Iron Corp.

Missouri Pacific has ordered 8755

tons of rail from the Tennessee company.

The Burlington has obtained protection from mills for about 30,000 tons of rails, but has placed no definite orders as yet.

The Santa Fe has ordered 69,700 tons of rails and 27,800 tons of track accessories. The rails were divided among Colorado Fuel & Iron Corp., Carnegie-Illinois Steel Corp., Bethlehem Steel Co., and Inland Steel Co.

Erie Railroad's recent allocation of rails is as follows: to Bethlehem Steel Co., 2269 gross tons; to Carnegie-Illinois Steel Corp., 13,949 tons; to Inland Steel Co., 1211 tons.

SHEETS AND STRIP

... Mills will soon be booked through entire first quarter

THE volume of sheet and strip business placed on the basis of price at time of shipment at PITTSBURGH has increased substantially in the past 10 days. This significant pick-up in business at an unknown price is undoubtedly the result of the present delivery situation. Many consumers who, for the past several weeks, have been going through a trying period as far as obtaining supplies is concerned, feel that steel will still be hard to obtain early next year. It is anticipated that this trend will continue for several weeks and that in a short time the country's sheet mills will practically be booked through the first quarter of 1940. There is already sufficient evidence to indicate that the total volume of business now on sheet and strip order books is so large that completion of shipments by the end of this year is impossible. Shipments of sheets to the Chrysler Corp. which have been held up due to plant shut downs, will only serve to complicate matters further when deliveries are resumed.

There will be little available excess hot mill capacity for a long time ahead unless the war ends, according to indications at CLEVELAND and YOUNGSTOWN. Cold mill capacity, however, may be available in first quarter, depending upon pile-up awaiting the skin pass. Deep draws required by the auto industry on 1940 models prevent full finishing too early. Roll changes are being held down wherever possible in an effort to speed up mills. Truck companies at CLEVELAND have large order backlog including heavy foreign business.

The only orders being accepted by

CHICAGO mills today are for first quarter delivery at price at time of shipment. Orders have slowed down considerably in the past two weeks, with pressure for deliveries the paramount problem confronting all mills today; sales departments, as well as the order and scheduling departments, are concentrating most of their time on this condition. Anxiety to obtain material is especially great on the part of railroad car builders, as the railroads in turn are in great need of the new equipment on order.

The heavy pressure of sheet orders has eased in SOUTHERN OHIO during the past week, and mill interests generally indicate that the problem now is to satisfy delivery demand. Although a portion of the present bookings were heretofore believed to be speculative, the current pressure for delivery convinces the mills that the amount of speculation is very small. Reported improvement in sheet consuming industries is noted by the regular demand of consumers for immediate delivery on present orders. First quarter inquiry and orders continues to be unusually good with many buyers willing to place orders on the basis of prices in effect at time of shipment.

PLATES

... Railroad demand has complicated delivery situation

THE situation in plates is that the larger producers are well booked through the fourth quarter. The railroad demand, coming on top of other requirements, has complicated the delivery situation. Some of the railroads are having difficulty in getting shipments as soon as they want them for car repair and rebuilding programs. Mills in EASTERN PENNSYLVANIA, which do not get as large a volume of railroad and shipbuilding business as do the larger producers, are able to make deliveries in four to six weeks, but they are filling up from the overflow of business, both domestic and foreign, and they expect that their deliveries will be more extended within the near future.

Export business, which some of the larger producers cannot take for shipment in this quarter, is going to Eastern mills, some of it at 2.70c. a lb., f. a. s. Moreover, a large part of the domestic business now being taken by Eastern mills is at the 2.35c. mill price recently announced. Export demand is growing, particularly from South American and Scandinavian

countries. The 2.70c. price is equivalent to 2.80c. on Scandinavian business owing to certain extra insurance and inspection costs. A large volume of Canadian business is expected to flow to this country for railroad and shipbuilding work. Plates for 25 locomotives to be built in Canada have been ordered from an American mill.

The office of general purchasing officer of the Panama Canal, Washington, will open bids on Nov. 9 for 3533 tons of fabricated steel plates and 2102 tons of fabricated structural shapes.

TUBULAR GOODS

... Sales holding up well ... Gasoline line to take about 25,000 tons

TUBULAR sales at PITTSBURGH continue to hold up exceptionally well, part of the good showing being due to export specifications from nations whose original source of supply has been cut off. The disposition of American oil companies to be more liberal in oil-country specifications continues.

The Gulf Oil Corp. recently purchased approximately 450 mi. of seamless pipe, the majority of which was 8½ in. and the balance 6½ in., for a gasoline line from St. Joe, Fla., to Atlanta, Ga. It is estimated that the order will require between 23,000 and 25,000 tons of steel and was placed with a large Pittsburgh pipe producer.

CLEVELAND producers are still able to schedule on a few pipe mills. Production on other units is heavily engaged, however. Considerable South American export business has been passed up.

SEMI-FINISHED STEEL

... Pressure for shipments heavy ... Orders placed for first quarter

TREMENDOUS pressure is being exerted by consumers to get more prompt deliveries on semi-finished steel. Mills at PITTSBURGH are bending every effort to attempt to meet pre-arranged delivery schedules but it will undoubtedly be several weeks before any of the present tension is released. Meanwhile, many consumers, noting how difficult it is to obtain supplies at the present time, are protecting themselves on deliveries alone for early next year by getting on mill order books as rapidly as possible on the basis of price at time of shipment.

COLD FINISHED BARS

... Orders still being taken for fourth quarter shipment

COLD finished bar specifications throughout the country continue to expand but some makers are still able to take business for shipment by the end of the year. Warehouse demand is heavy and requirements from automotive companies and home appliance manufacturers are exceptionally large. Emphasis at the present time is on deliveries and some consumers are reporting their inability to obtain supplies.

BOLTS, NUTS AND RIVETS

... Shipments continue to gain, though new orders are lighter

SHIPMENTS of all producers, which showed an average increase of around 25 per cent during September over August, continue to gain momentum. Incoming orders at CLEVELAND are slower but production is engaged at full tilt on many items and sizes and will be for some time ahead. Difficulty in getting steel is reported frequently.

WIRE PRODUCTS

... Secondary buying wave at Pittsburgh ... Export demand good

FRESH wire business in PITTSBURGH, as far as it affects rods and manufacturers' wire, has expanded considerably in the past 10 days. This secondary buying wave is believed to be the result of consumers' fears that supplies will be hard to obtain early

next year. All such business, of course, is being booked on the basis of price at time of shipment and represents specific specifications. Some merchant wire producers are still able to take a small amount of business for delivery before the end of the year. Only in exceptional cases are specifications for merchant wire products, subject to shipment after the first of the year, accepted. By the time prices on wire rods and manufacturers' wire are announced, it is likely that steel mill output for the first quarter of 1940 will have been used up.

New business at CLEVELAND has been quieter recently. Jobbers and manufacturers continue pressing for quicker shipments. South American export orders are in generous volume. Sellers are reluctant to schedule production too far in advance.

New business in CHICAGO consists mainly of fill-in orders, delivery on which can be assured this year only at the expense of other tonnage. Sales departments are spending most of their time working on deliveries for their customers. Demand of jobbers in the rural sections continues strong. Speculative buying among farmers is negligible.

TIN PLATE

... Operations at 96% ... American Can Co. adopts new plan

TIN plate operations this week are estimated at 96 per cent of standard running time, unchanged from a week ago. Although the volume of tin plate business placed since Sept. 1 has been tremendous, it is not believed that it represents a dangerous or top-heavy inventory condition. As a matter of fact, some trade sources believe that after a temporary lull following Jan. 1, normal buying will continue.

The American Can Co. has notified its customers that it will refund 2 per cent of the amounts received for cans during 1939, but it is understood that this does not involve a refund from manufacturers of tin plate, as was the case in 1938. The can company has also adopted a new form of contract for 1940 which provides for the establishment at the beginning of the year of a "ceiling price" for that year. Can prices will be based on this tin plate price, but refunds will be made for any reduction in the price of tin plate amounting to 10c. or more per base box. No refunds will be made if the cost of tin plate is lower by less than 10c. per base box.

This action has been made necessary by the recently adopted plan of tin plate manufacturers in announcing quarterly prices of tin plate instead of a price which was good for the first nine months of a calendar year.

MERCHANT BARS

... Mills booked well into first quarter

BAR mills at PITTSBURGH are running at an operating rate consistent with their ability to obtain raw steel supplies. It is problematical whether the present volume of business now on the books can be shipped by the end of this year or even by the end of January. The situation is further complicated by the insistence of many consumers that additional orders be placed on mill books subject to mill convenience on delivery and subject to price at time of shipment. The tight delivery situation and the reported inability of many consumers to obtain the steel they require for their own operations have caused some concern as

Weekly Bookings of Construction Steel

| | Week Ended | | | | Year to Date | |
|-------------------------------------|---------------|---------------|----------------|---------------|--------------|-----------|
| | Oct. 24, 1939 | Oct. 17, 1939 | Sept. 26, 1939 | Oct. 25, 1938 | 1939 | 1938 |
| Fabricated structural steel awards | 21,800 | 18,450 | 22,750 | 33,350 | 808,025 | 727,725 |
| Fabricated plate awards | 160 | 1,440 | 35,715 | 2,080 | 159,705 | 114,080 |
| Steel sheet piling awards | 110 | 1,290 | 0 | 800 | 69,025 | 36,190 |
| Reinforcing bar awards | 5,155 | 7,950 | 15,825 | 8,200 | 391,450 | 282,825 |
| Total Letting of Construction Steel | 27,225 | 29,130 | 74,290 | 44,430 | 1,428,205 | 1,160,820 |

to whether or not supplies can be obtained promptly early next year.

At CLEVELAND inquiries and orders have dropped off sharply in the past week. Production continues at a high rate and consumers are anxious for quick shipments. Most plants are producing near the level of their incoming steel or slightly above the level.

The CHICAGO situation on merchant bars is little changed from the last week or so. Mills are booked to the end of the year except for certain sizes. CHICAGO district finishing capacity for bars is not being entirely utilized because the bar mills are unable to obtain sufficient raw steel. A survey of production at plants of important bar consumers, such as makers of farm implements and farm tractors, steel warehouses, automobile parts makers and railroad equipment manufacturers, indicates that practically all of the tonnage being shipped today is going into immediate use.

STRUCTURAL STEEL

... Awards 21,800 tons ... Airplane engines plant to take 1650 tons

STRUCTURAL steel lettings advanced to 21,800 tons from 18,450 tons last week. The largest awards were on the Pacific Coast and include 4000 tons for transmission towers at Kelso, Cehalis and Renton, Wash.; 3000 tons for Navy hangars at Alameda, Cal., and 3000 tons for dam structures at Friant, Cal. Other sizable awards are 1650 tons for the Wright Aeronautical Corp., Paterson, N. J.; 1500 tons at Jersey City for a power house for the Public Service Electric & Gas Co., and 1000 tons for an apartment building in New York at Fifth Avenue and Ninth Street.

Structural steel inquiries at 12,700 tons include more than 2000 tons for Army and Navy requirements. The largest new jobs reported are 1300 tons for trash racks for the Fort Peck Dam, Mont.; 1200 tons for transmission towers for the TVA; 1044 tons at Tucumcari, N. M., for tunnel supports for the Conchas Canal, and 1000 tons at Philadelphia for an aeronautical laboratory for the Navy Department.

Structural specifications at PITTSBURGH, while not up to the level of some other steel products, nevertheless are being maintained at a fairly substantial rate. Lack of raw steel supplies has created a delivery situa-

tion here as elsewhere. Some construction projects which had been lagging or which had been previously set up over a long period, have been speeded up, necessitating a greater demand on steel producers than was originally anticipated.

The Bureau of Supplies and Accounts, Navy Department, will open bids on Oct. 31 for 329 tons of black and 275 tons of galvanized shapes for delivery at the Philadelphia Navy Yard.

REINFORCING BARS

... New projects call for 13,000 tons, mostly public work

REINFORCING steel awards of 5155 tons include 1135 tons for the Treasury Department at Los Angeles, the only sizable letting.

New projects are declining season-13,000 tons include 3230 tons for the Shasta Dam, Coram, Cal.; 3000 tons for a housing project at Hartford, Conn.; 2000 tons for a housing project at Holyoke, Mass.; 1800 tons for barracks at Hickam Field, T. H., and 1000 tons for a powder magazine at Savannah, Ill.

New projects are declining seasonally but mill specifications are holding up to a good level. Present demand for concrete bars would be unlikely to support a further advance in prices, hence the anticipated moderate increase in general steel products will probably not include a change in current published prices for concrete bars.

IRON ORE

... September consumption largest for any month since October 1937

CONSUMPTION of Lake Superior district iron ore in September at 4,184,884 gross tons was the highest for any month since October, 1937, when 4,203,873 tons was used, according to the Lake Superior Iron Ore Association.

The September consumption compared with 3,775,132 tons in August and 2,313,865 tons in September, 1938. Total amount used by the steel industry this year to Oct 1 (nine months) was 28,074,239 tons, well above the 25,703,050 for the entire 1938 consumption. Ore at furnaces Oct. 1 totaled 31,203,096 tons and on Lake Erie docks awaiting shipment to interior furnaces 4,650,077 tons. This total on hand, 35,853,173 tons, compared with

32,714,372 tons a month ago, 37,873,559 a year ago and 39,953,610 on Oct. 1, 1937.

There were 137 furnaces using Lake ore in blast on Sept. 30 compared with 111 at the end of August and 76 on Sept. 30, 1938.

Of the 303 bulk freighters in the American ore-carrying fleet on the lakes, 287, or 94.72 per cent, were active Oct. 15, according to the monthly report of C. C. Lindeman, statistician for the M. A. Hanna Co.

The Tennessee Coal, Iron & Railroad Co. has announced that it will reopen Wenonah No. 10 red ore mine on Nov. 1. This will bring all eight of the company's red ore mines into production. Seven of them are now on double shift. Wenonah No. 10 will operate on a single shift, with 125 men.

Scrap Consumption Up 13% in September

DOMESTIC consumption of iron and steel scrap increased 13 per cent in September to a total of 3,282,000 gross tons, the largest for any month in about two years, according to the Institute of Scrap Iron and Steel, Inc., New York.

September consumption, which includes "home" as well as purchased scrap, represented an increase of 13 per cent over August, and 50 per cent over September, 1938.

In the first nine months of 1939, according to the Scrap Institute, domestic consumption has totaled 23,202,000 tons compared with 13,992,000 tons in the corresponding period one year ago. In all 1938, only 21,500,000 tons was melted.

Government reports place exports of scrap in the first eight months of 1939 at 2,430,914 tons, against 2,014,051 tons in the comparable period of 1938. September exports probably will show the third successive monthly decline, and indications are that the 1939 total will approximate 1938 exports of 2,998,000 tons.

Carloadings in Canada Increase in July

REVENUE freight loaded in Canada and received from foreign connections in July amounted to 6,274,181 tons, as compared with 5,824,030 tons in the preceding month, 5,434,917 tons in July, 1938, and 6,698,709 tons in July, 1937, according to the Dominion Bureau of Statistics.

FABRICATED STEEL

... Lettings advance to 21,800 tons from 18,450 tons last week ... New projects lower at 12,700 tons ... Plate awards only 160 tons.

NORTH ATLANTIC STATES AWARDS

- 1650 Tons, Paterson, N. J., Wright Aeronautical Corp. factory building, to Truscon Steel Co., Youngstown.
- 1500 Tons, Jersey City, N. J., Marion power house for Public Service Electric & Gas Co., to Lehigh Structural Steel Co., Allentown, Pa.
- 1000 Tons, New York, 17-story apartment building, Fifth Avenue and Ninth Street, to Harris Structural Steel Co., Plainfield, N. J.
- 800 Tons, New York, board mill for National Gypsum Co., to Ingalls Iron Works Co., Birmingham.
- 620 Tons, Union City, N. J., repairs to 14th Street viaduct, to Bethlehem Steel Co., Bethlehem, Pa.
- 430 Tons, Grasselli, N. J., General Aniline building, to H. R. Goeller, Inc., Jersey City.
- 410 Tons, Long Branch, N. J., Monmouth Memorial Hospital, to Bethlehem Steel Co., Bethlehem, Pa.
- 270 Tons, Corning, N. Y., Corning Glass Works laboratory, to Leach Steel Corp., Rochester, N. Y.
- 250 Tons, Barton, Vt., State bridge, to American Bridge Co., Pittsburgh; Littleton Construction Co., Littleton, N. H., contractor.
- 160 Tons, Rochester, N. Y., Sibley, Lindsay & Curr garage, to Leach Steel Corp., Rochester, N. Y.
- 150 Tons, Carlisle, Pa., building, to Reading Steel Products Co., Reading, Pa.
- 130 Tons, Monroe County, Pa., bridge, R-168, to American Bridge Co., Pittsburgh.
- 120 Tons, Ludlow-Mount Holly, Vt., State bridge, to American Bridge Co., Pittsburgh; Bennington Construction Co., Bennington, Vt., contractor.
- 115 Tons, Norwalk, Conn., power plant addition, to Leake & Nelson Co., Inc., Bridgeport, Conn.
- 110 Tons, Rochester, N. Y., Gleason Works addition, to Genesee Bridge Co., Rochester.
- 110 Tons, Tionesta Dam, Pa., operating house for U. S. Engineer, Pittsburgh, to Keystone Engineering Co., Pittsburgh.
- 105 Tons, Pearl River, N. Y., building for Chemical Construction Co., to an unnamed bidder.

THE SOUTH

- 670 Tons, Pensacola, Fla., landplane hangars, to Jones & Laughlin Steel Corp., Pittsburgh.
- 545 Tons, Benwood, Va., tube mill for Wheeling Steel Corp., to Ingalls Iron Works Co., Birmingham.

CENTRAL STATES

- 990 Tons, Conneaut, Ohio, rebuilding viaduct, Nickel Plate Railroad, to American Bridge Co., Pittsburgh.
- 400 Tons, Monticello, Ill., State bridge FA-route 135, section 11-F, to Bethlehem Steel Co., Bethlehem, Pa.
- 200 Tons, Milwaukee, crane runway for Milwaukee Road, to Milwaukee Bridge Co., Milwaukee.
- 185 Tons, Watersmeet, Mich., bridge, to Worden-Allen Co., Milwaukee.
- 165 Tons, Cornland, Ill., State bridge, to Midland Structural Steel Co., Cicero, Ill.
- 150 Tons, Wood County, Ohio, State grade separation, to Bethlehem Steel Co., Bethlehem, Pa., through Visintine Co., Columbus, Ohio.
- 140 Tons, Versailles, Ill., bridge section 13F, to Duffin Iron Co., Chicago.
- 125 Tons, Milwaukee, girder spans for State, to Lakeside Bridge & Steel Co., Milwaukee.

WESTERN STATES

- 4000 Tons, Kelso-Chehalis-Renton, Wash., transmission towers, to American Bridge Co., Pittsburgh.
- 3000 Tons, Friant, Cal., Friant Dam structures, to Consolidated Steel Corp., Los Angeles.

- 3000 Tons, Alameda, Cal., Navy hangars, to Herrick Iron Works, Oakland, Cal., through H. Mayson, Los Angeles, contractor.
- 280 Tons, Redding, Cal., coaster gate frames at Shasta Dam, to American Bridge Co., Pittsburgh.

PENDING STRUCTURAL PROJECTS NORTH ATLANTIC STATES

- 1000 Tons, Philadelphia, aeronautical laboratory for Navy Department.
- 900 Tons, Brooklyn, psychiatric patients' pavilion for City of New York.
- 550 Tons, Jamaica, N. Y., garage for North Shore Bus Co.
- 550 Tons, Cheektowaga, N. Y., completion of grade-crossing elimination; bids taken Oct. 25.
- 500 Tons, Aberdeen, Md., ballistic research laboratory for Army Department.
- 443 Tons, Livingston County, N. Y., highway project R.C. 2575; Hudson Valley Construction Corp., Avon, N. Y., low bidder on general contract (previously reported).
- 382 Tons, Erie County, N. Y., grade separation, project P.S.C. 4236; Border Building Co., Buffalo, low bidder on general contract (previously reported).
- 242 Tons, Tioga County, N. Y., includes 27 tons reinforcing steel highway bridge, project R.C. 4078, Maple City Lumber & Supply Co., Inc., Hornel, N. Y., low bidder on general contract (previously reported).
- 235 Tons, Allegany County, N. Y., includes 50 tons reinforcing steel grade separation, project P.S.C. 6566; Bero Engineering & Construction Corp., North Tonawanda, N. Y., low bidder on general contract (previously reported).
- 225 Tons, Palmer, N. Y., mill building for International Paper Co.
- 222 Tons, Montville and Caldwell, N. J., two bridges over Passaic River; bids close Nov. 10.
- 175 Tons, Philadelphia, magazine buildings, Fort Mifflin Depot.
- 150 Tons, Newark, N. J., building for Vita-Var Corp.
- 147 Tons, West Carteret, N. J., grade elimination project; bids close Nov. 10.
- 132 Tons, Adams, N. Y., grade separation, project P.S.C. 5418 and 6143; Richard Hopkins Co., Albany, N. Y., low bidder on general contract (previously reported).
- 125 Tons, Baltimore, Northwood shopping center for Roland Park Co.
- 120 Tons, Elmira, N. Y., store building for Langdon Estate.

SOUTH AND SOUTHWEST

- 1200 Tons, power transmission towers, for TVA; bids Nov. 6.
- 1044 Tons, Tucumcari, N. M., tunnel supports, Conchas Canal; bids Nov. 16.
- 500 Tons, Portsmouth, Va., turret assembly and welding shop for Navy Department; bids close Dec. 3.
- 200 Tons, Collier, W. Va., girder spans, for Pennsylvania Railroad Co.
- 160 Tons, Lexington, Ky., housing project.

CENTRAL STATES

- 400 Tons, Detroit, stock cellar building for Tivoli Brewing Co.
- 350 Tons, Evansville, Ind., office building for Mead Johnson & Co., bids Nov. 2.
- 250 Tons, Robbinsdale, Minn., State bridge No. 5583.
- 140 Tons, Fayetteville, Ohio, State bridge; bids Oct. 27. (Also 40 tons of reinforcing steel.)

WESTERN STATES

- 1300 Tons, Fort Peck Dam, Mont., trash racks, etc.
- 975 Tons, Los Altos, Cal., conveyor framework for Permanente Corp. cement plant; bids taken Oct. 24.
- 300 Tons, Pueblo, Colo., bridge No. 587 for Missouri Pacific Railroad.
- 300 Tons, Seattle, F. W. Woolworth building.
- 265 Tons, Ravalli County, Mont., Bitterroot River bridge; bids in.
- 225 Tons, San Francisco, stock arena; bids in.

- 200 Tons, Eureka, Cal., State bridge; bids Nov. 29.
- 135 Tons, Wibaux County, Mont., Beaver Creek Bridge; bids in.
- 117 Tons, Palo Alto, Cal., underpass; bids Nov. 8.

FABRICATED PLATES AWARDS

- 160 Tons, Winona, Minn., two oil tanks for Standard Oil Co. of Indiana, to Chicago Bridge & Iron Co., Chicago.

PENDING PROJECTS

- 520 Tons, Burbank, Cal., 24-in. pipe; bids taken Oct. 24.
- 276 Tons, Tucumcari, N. M., tunnel liners, Conchas Canal; bids Nov. 16.

SHEET PILING AWARDS

- 110 Tons, Chicago, subway station section, to Bethlehem Steel Co., Bethlehem, Pa.

Standards Bureau Tests Alloys for Soil Corrosion

WASHINGTON — After testing 1600 specimens of underground pipe and protective coatings subjected to from five to nine years' exposure, the Bureau of Standards reports that the addition of small amounts of chromium, copper, nickel and other elements in iron or steel appears to have no marked effect on the resistance of the alloys to soil corrosion.

Ferrous alloys containing large amounts of chromium have definitely lower rates of loss of weight than other ferrous materials tested, the bureau said, but they also have fewer pits per unit area. Alloys containing chromium alone, however, may pit deeply. The tests also showed that the addition of nickel to chromium-iron alloys appears to improve the alloy with respect to loss of weight and depth of pits and tests of alloy sheets suggest that an alloy containing 23 per cent chromium, 13 per cent nickel, and 1.8 per cent manganese may be less resistant to soil corrosion than an alloy containing smaller percentages of these elements.

The bureau reported that, with the exception of alloys containing large percentages of chromium, two ferrous alloys containing both copper and nickel in considerable amounts resisted soil corrosion better than other ferrous materials, but that it has been found difficult to determine from the available data whether the results should be attributed to one or both of the alloying elements.

Additional observations made by bureau experts were that copper and its alloys corroded at much slower rates than the commonly used ferrous materials at most of the test sites; that the pits on many specimens were too shallow to be measured accurately by methods used; and that in several soils dezincification affected the specimens containing large percentages of zinc.

REINFORCING STEEL

... Awards of 5155 tons; 13,000 tons in new projects.

ATLANTIC STATE AWARDS

- 950 Tons, Cambria County, Pa., unit No. 3, flood control, to Bethlehem Steel Co., Bethlehem, Pa., through A. J. Albrecht, Chicago, contractor.
- 450 Tons, Green Haven, N. Y., cell blocks, to Bethlehem Steel Co., Bethlehem, Pa., through Amsterdam Building Co., contractor.
- 400 Tons, Perth Amboy, N. J., housing project, to Truscon Steel Co., Youngstown, through R. & G. Construction Co., contractor.
- 150 Tons, West Hartford, Conn., bars and mesh, Pratt & Whitney Division United Aircraft Corp. manufacturing unit, to Truscon Steel Co., New York.
- 125 Tons, Providence, R. I., bars and mesh, municipal wharf storage building, to Barker Steel Co., Cambridge, Mass.
- 125 Tons, New London-Waterford, Conn., mesh, State bridge, to Truscon Steel Co., New York.

SOUTH AND CENTRAL

- 950 Tons, Chicago, subway, section S-4-B, to Bethlehem Steel Co., Bethlehem, Pa., through John C. Tully Co., contractor.
- 120 Tons, Chicago, Illinois Bell Telephone Co., to Inland Steel Co., Chicago.
- 100 Tons, Winnetka, Ill., school, to Truscon Steel Co., Youngstown, through O. J. Dean Co.

WESTERN STATES

- 1134 Tons, Los Angeles, United States Treasury list (Invitation A-9564), to Bethlehem Steel Co., Los Angeles.
- 237 Tons, Alameda, Cal., Navy hangars to Herick Iron Works, Oakland, Cal.; through H. Mayson, Los Angeles, contractor.
- 188 Tons, Merced County, Cal., highway work,

- to Gilmore Steel & Supply Co., San Francisco; through Marshall Hanrahan, Redwood City, Cal., contractor.
- 110 Tons, Arcata, Cal., Humboldt State College dormitory, to Ceko Steel Products Co., San Francisco.
- 100 Tons, Hopland, Cal.; bridge, to Truscon Steel Co., San Francisco; through Trewit, Shields & Fisher, Fresno, Cal., contractors.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

- 3000 Tons, Hartford, Conn., housing project.
- 2000 Tons, Holyoke, Mass., housing project.
- 250 Tons, Livingston County, N. Y., highway project R.C. 4071, Rochester Concrete Construction Corp., Rochester, N. Y. low bidder on general contract.
- 117 Tons, Erie County, N. Y., grade separation, project P.S.C. 4236, Border Building Co., Buffalo, low bidder on general contract.

SOUTH AND CENTRAL

- 1000 Tons, Savanna, Ill., powder magazine for Ordnance Department; Midwest Asphalt & Construction Co., Chicago, low bidder on general contract.
- 1000 Tons, Peoria, Ill., housing project; Patrick Warren Construction Co., Chicago, low bidder on general contract.
- 300 Tons, Zanesville, Ohio, Pershing Road housing; bids Oct. 31.
- 150 Tons, Chicago, water department.
- 150 Tons, MacComb, Miss., housing project, bids taken Oct. 24.

WESTERN STATES

- 3230 Tons, Coram, Cal., Shasta Dam (Invitation 33354-A); bids Oct. 26.
- 1800 Tons, Hickam Field, T. H., barracks; bids Nov. 21.
- 493 Tons, Rutledge, Tex., Marshall Ford Dam (Invitation A-46802); bids in.
- 311 Tons, Palo Alto, Cal., underpass; bids Nov. 8.
- 255 Tons, Rutledge, Tex., Marshall Ford Dam (Inv. A-46807-A); bids Oct. 26.
- 213 Tons, Los Angeles, bridge over Arroyo Seco near Marmion Way; bids Nov. 1; previous bids rejected.

CAST IRON PIPE

Framingham, Mass., has placed 4000 ft. of 8-in. cement lined pipe with Warren Foundry & Pipe Corp., Boston.

Worcester, Mass., is in the market for 6000 ft. of 12-in. pipe.

Treasury Department, Boston, has placed 7344 ft. of 8-in. pipe for Springfield, Mass., with United States Pipe & Foundry Co., Boston.

General Purchasing Officer, Panama Canal, Washington, closes bids Nov. 2 for large quantities of cast iron pipe (Schedule 3673).

Chauncey, Ohio, plans pipe lines for water system and other waterworks installation. Fund of about \$190,000 will be arranged for this and sewerage system. J. J. Morgan, 255 East Broad Street, Columbus, Ohio, is consulting engineer.

Waukesha, Wis., will take bids soon for one carload of about 50 to 60 tons of cast iron water pipe, various sizes, for extensions and replacements. A. P. Kuranz, superintendent, water department, is in charge.

Sacramento, Cal., has awarded 190 tons of 4, 6, 8, 10 and 12-in. pipe to American Cast Iron Pipe Co., San Francisco.

Bremerton, Wash., has awarded 438 tons of 6, 8 and 12-in. pipe to United States Pipe & Foundry Co., San Francisco.

Arcadia, Cal., has awarded 223 tons of 6, 8 and 12-in. pipe to United States Pipe & Foundry Co., San Francisco.

Sunnyside, Wash., will take bids October 27 for pipe lines requiring 170 tons of 6, 8, 10 and 12-in. pipe.

San Francisco will take bids Oct. 30 on 700 tons of 3, 6 and 8-in. pipe.

San Diego, Cal., has awarded contract to B. G. Carroll and Harry L. Foster, 2260 Main Street, on joint bid of \$107,026.15 for

new 30-in. main pipe line in Upas Street for water system, about 9600 ft., including special castings, valves, etc.

Arlington, Wash., plans pipe line extensions and replacements in water system now being acquired from Puget Sound Power & Light Co., to be operated as municipal property in future. Bond issue of \$60,000 has been approved for entire project.

Winnsboro, Tex., has plans for pipe lines for water system and other waterworks installation; also for sewerage system. Albert C. Moore & Co., Smith-Young Tower Building, San Antonio, Tex., are consulting engineers.

Jacksonville, Tex., plans pipe line extensions and replacements in water system. Financing is being arranged through Federal aid. H. L. Thackwell, 209 Cotton Street, Longview, Tex., is consulting engineer.

Fort Lauderdale, Fla., plans 10-in. main line for water system over new causeway to beach district. Cost estimated at \$109,800. Also will make extensions in general water system, install additional filtration and other waterworks equipment. Bond issue of \$250,000 is being arranged for entire project. Solomon, Norcross & Keis, City Hall Building, are engineers.

Hollandale, Miss., has plans for about 11,000 ft. for water system; also other waterworks installation. Fund of \$26,295 has been arranged through Federal aid.

Lilesville, N. C., plans pipe lines for water system and other waterworks installation. Special election has been called Nov. 14 to approve bonds for \$38,000 for this and sewerage system.

Moscow, Idaho, plans 6 to 16-in. pipe for extensions and replacements in water system; also new steel water tank and tower, about 500,000-gal. capacity, with alternate bids on concrete tank. H. J. Smith is city engineer.

... PIPE LINES ...

East Ohio Gas Co., 1405 East Sixth Street, Cleveland, plans welded steel pipe line from connection with present system to new electric steel mill of Copperweld Steel Co., Warren, Ohio, about six miles, for gas supply for mill service, for which contract has been secured. Control and regulator station will be located at mill. Cost over \$60,000.

General Purchasing Officer, Panama Canal, Washington, asks bids until Nov. 3 for 129,920 ft. of galvanized welded steel pipe, and 10,080 ft. of black ungalvanized welded steel pipe (Schedule 3676).

Shell Oil Co., Inc., Shell Building, St. Louis, has let contract to Latex Construction Co., Second National Bank Building, Houston, Tex., for welded steel pipe lines for natural gas supply for new natural gasoline extraction plant in Magnolia gas field, Columbia County, Ark., to be owned and operated jointly with Atlantic Refining Co., Philadelphia, and other oil interests. Award for steel pipe for connections with producing wells and plant service has been divided among American Rolling Mill Co., Allegheny Ludlum Steel Co., and Spring, Chalfant & Co. Entire project will cost close to \$700,000. Award for gasoline plant has been made to Gasoline Plant Construction Corp., Second National Bank Building, Houston.

Picayune, Miss., has plans for steel pipe line system for municipal natural gas distribution, including control station and other operating facilities. Special election has been called Oct. 31 to vote bonds for \$220,000 for project.

Bureau of Reclamation, Denver, has let contract to Crane-O'Fallon Co., Denver, at \$36,735 for steel pipe and fittings, valves, etc., for bypass, drain and air inlet pipe lines for 102-in. gates for outlet works at Marshall Ford Dam, Colorado River project, Tex. (Specifications 1273-D).

Hanley & Bird, Inc., Kennedy Street, Bradford, Pa., plans welded steel pipe line in connection with drilling of new wells in Oriskany natural gas field district near Canisteo, N. Y.; also steel pipe line gathering system and other operating facilities. F. E. Eckert is manager.

Davis & Co., Inc., Esperson Building, Houston, Tex., oil and gasoline products, plans welded steel pipe lines for natural gas transmission to new re-cycling plant to be located on a 12,000-acre tract in Rincon field, Starr County, Tex., recently acquired. Lines will have capacity for handling about 60,000,000 cu. ft. per day for plant service.

Bureau of Reclamation, Denver, closes bids Nov. 2 for seven 72-in. outside diameter welded steel pipe lines for drainage crossings for Salt Lake aqueduct, Provo River project, Utah (Specifications 1295-D); until Nov. 6 for steel pipe, fittings, valves and accessories for Elephant Butte hydroelectric power plant, Rio Grande project, New Mexico (Specifications 1294-D).

House Committee Pushes Investigation of NLRB

WASHINGTON—In addition to the 60,000 questionnaires mailed out several months ago to employers and unions, the special House Committee named to investigate the National Labor Relations Board is sending queries to professors of constitutional labor and administrative law throughout the country, asking for opinions from this branch of legal authorities as to whether the board has been impartial in administering the Wagner Act. The committee is expected to open public hearings some time next month.

... NON-FERROUS ...

... New domestic buying fairly light, but shipments are at record rates ... Export copper inquiry widens ... September lead shipments largest since March, 1937.

NEW YORK, Oct. 24—With most domestic consumers fairly well covered on the next three months' needs, their chief activity at present is facilitating shipments from producers. While most producers still have a modified form of restriction in effect on shipments, available supplies are being distributed on the basis of reasonable needs and very few cases have come to light wherein productive

activity has been hampered by lack of necessary raw materials. Producers' sales of copper last week were at about the same rate as the preceding week, and while most of the demand is for nearby positions, the bulk of sales actually made were for future delivery. The producers' price remains unchanged at 12.50c., per lb., Connecticut Valley, although very little nearby metal is actually available at this price.

NON-FERROUS PRICES

Cents per lb. for early delivery

| | Oct. 18 | Oct. 19 | Oct. 20 | Oct. 21 | Oct. 23 | Oct. 24 |
|-----------------------------------|------------------------|---------|---------|---------|---------|---------|
| Copper, Electrolytic ¹ | 12.50 | 12.50 | 12.50 | 12.50 | 12.50 | 12.50 |
| Copper, Lake | 12.50 | 12.50 | 12.50 | 12.50 | 12.50 | 12.50 |
| Tin, Straits, New York | Nominally 55c. to 56c. | | | | | |
| Zinc, East St. Louis ² | 6.50 | 6.50 | 6.50 | 6.50 | 6.50 | 6.50 |
| Lead, St. Louis ³ | 5.35 | 5.35 | 5.35 | 5.35 | 5.35 | 5.35 |

¹Delivered Conn. Valley. Deduct ¼c. for New York delivery. ²Add 0.39c. for New York delivery. ³Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

| | New York | Cleveland |
|--|----------|-----------|
| Tin, Straits pig | 57.50c. | Nominal |
| Copper, Lake | 13.75c. | 13.625c. |
| Copper, electro | 13.50c. | 13.625c. |
| Copper, castings | 13.125c. | 13.375c. |
| *Copper sheets, hot-rolled | 20.87c. | 20.87c. |
| *Yellow brass sheets | 19.06c. | 19.06c. |
| *Seamless brass tubes | 21.81c. | 21.81c. |
| *Seamless copper tubes | 21.37c. | 21.37c. |
| *Yellow brass rods | 15.23c. | 15.23c. |
| Zinc slabs | 7.875c. | 8.125c. |
| Zinc sheets, No. 9 casks | 12.00c. | 12.10c. |
| Lead, American pig | 6.50c. | 6.125c. |
| Lead, bar | 8.95c. | 8.75c. |
| Lead, sheets, cut | 8.50c. | 8.50c. |
| Antimony, Asiatic | 16.00c. | 17.00c. |
| Alum., virgin, 99 per cent plus | 21.50c. | 22.50c. |
| Alum., No. 1 remelt, 98 to 99 per cent | 19.00c. | 19.50c. |
| Solder, ½ and ½ | 34.25c. | Nominal |
| Babbitt metal, commercial grade | Nominal | Nominal |

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/3; on brass sheets and rods, 40; on brass tubes, 33 1/3, and copper tubes, 40.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

| | Dealers' Buying | Dealers' Selling |
|-------------------------------------|-----------------|------------------|
| Copper, hvy. crucible... | 10.125c. | 10.75c. |
| Copper, hvy. and wire. | 9.125c. | 9.50c. |
| Copper, light and bottoms | 8.125c. | 8.625c. |
| Brass, heavy | 5.50c. | 6.00c. |
| Brass, light | 4.625c. | 5.375c. |
| Hvy. machine composition | 9.25c. | 10.125c. |
| No. 1 yel. brass turnings | 5.25c. | 5.75c. |
| No. 1 red brass or compos. turnings | 9.125c. | 9.625c. |
| Lead, heavy | 4.375c. | 4.75c. |
| Cast aluminum | 8.50c. | 9.50c. |
| Sheet aluminum | 14.50c. | 15.50c. |
| Zinc | 3.125c. | 4.375c. |

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 14c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICK-SILVER, \$150 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.75c. a lb.

In the open market nearby shipment would require paying between 12.625c. and 12.75c. per lb. Greater activity in the copper export market was noted in the past week with Japan reported buying at 13c. per lb., f.a.s.

Zinc

Sales of spelter in the past week increased slightly, but was confined mostly to small lots. Total turnover for the week amounted to about 4200 tons, with shipments at 5829 tons. In the preceding period sales were 3219 tons and shipments 6240 tons. Roughly 50 per cent of the past week's bookings called for November-December delivery. Quotations remain firm and unchanged at 6.89c. per lb. New York. The combined deliveries of brass and bronze ingots and billets by members of the Non-Ferrous Ingot Metal Institute in September amounted to 7539 tons.

Lead

Shipments in December were 59,544 tons, or 14,519 tons in excess of August and the highest monthly total since March, 1937. Production in the month amounted to 39,253 tons, or 253 tons above the August output. The present month will probably show a large increase in production over the September figure as many mines reopened toward the close of September were not able to get into production in time to show up in the September figures. The disparity between shipments and production caused a reduction in stocks to 97,702 tons from 117,895 tons at the end of August. The September stock position was the lowest since October, 1937. Buying in the past week was at a slower pace than in the previous week and was mostly for November shipment, although an occasional October carlot is still being accepted. Prices remain unaltered at 5.50c. per lb., New York.

Tin

Conditions in the tin market are little changed. Demand continues far in excess of offerings, with importers able to offer only negligible quantities. The only nearby tin available is resale material and that also is available in only very limited amounts. The situation in the eastern market is unchanged. Prices in the past week were nominally 55 to 56c. on spot Straits, New York, all week. The maximum prices set by the British Government remain unchanged at £230.

IRON AND STEEL SCRAP

... Mixed trends noted this week as composite declines 12½c. to \$20.875, but a stronger undertone is beginning to appear.

OCT. 24—Broker transactions at Pittsburgh warrant no change in the quoted range on No. 1 steel there and an undertone of strength is observed as restrictions on shipments are lifted. Following the slump at Chicago and the deluge of material that was cut loose, there has been a small increase in the average price of No. 1 steel, but at Philadelphia the reaction that began three weeks ago is still in evidence and the average is down nominally 50c. Similar declines took place at Buffalo, although no new sales are reported. Buying prices at Cincinnati have been marked down 50c. while St. Louis prices have advanced. Prices elsewhere are virtually unchanged. The net result of the movement of prices in the principal markets has been a decline of 12½c. in the composite price to \$20.87, as against a drop of \$1.08 the week before, indicating that the reaction may have about run its course.

Price advances of 50c. to \$1 a ton have taken place in the Canadian market. Export buying prices are softer at Boston because of congestion at loading points, but at New York prices are firm. It is intimated that some of the old European contracts have been moderated in the light of war conditions and the position of the domestic market.

Elsewhere in this issue is the announcement of the U. S. Bureau of Mines that it will conduct a survey to determine the volume of stocks of scrap in the hands of steel companies, scrap dealers and others.

Pittsburgh

A stronger undertone has appeared in the market which is partially due to the recent reaction and also to the fact that some consumers who had been regulating shipments have now eliminated restrictions. Most transactions in the past week involve broker coverages. Some brokers who have been offering less than \$22 a ton for No. 1 steel are finding very little supplies at \$22 a ton. No. 1 heavy melting is quotably unchanged this week at \$22 to \$23 a ton, and the dollar spread will be justified until the present situation is clarified to a greater extent.

Chicago

So much material moved out when this market slumped off from the \$20

level that activity since has been lax with no mill buying and but few broker-dealer transactions. Brokers today are offering \$18.25 and \$18.50 for No. 1 steel, the latter figure bringing out scrap without difficulty but not freely. The last mill sale was at \$18.50. Mill operations continue at near capacity. The Illinois Central and Rock Island sold steel last week for slightly more than \$19 a gross ton, delivered. Lists were not large and it is believed by some that they were purposely small in anticipation of future market strength.

Philadelphia

The reaction which started three weeks ago continued to be in evidence in the past week and prime steel making items are currently quotable 50c. lower, making No. 1 steel nominally \$21.50 to \$22. One district mill recently purchased a small tonnage of No. 1 steel at \$20 and No. 2 at \$18.50, but with yard stocks in the present depleted condition, it is unlikely that any large tonnage could be obtained at those prices. Dealers are covering at up to \$20.50 for No. 1 grade. With open-hearth operations still expanding, it is probable that some mills will be in the market shortly, although one large consumer reports being covered for the next 60 days. Material is coming out freely and at one point it has been necessary to regulate the volume of incoming cars.

Correction: In last week's market the words "six years" should have read "six weeks."

Cleveland

Conditions remain about the same as last week here, the downward adjustment having ended for the time being at least. Dealers are buying against old orders at quoted levels; mills are keeping an eye on the market and may be in for more material before long.

Youngstown

The market is underlaid by more strength than might be expected after two weeks of declining quotations. At the start of this week no changes appear necessary. Open-hearth operations remain at a high rate and scrap shipments to consuming mills are going forward steadily.

Buffalo

Despite the fact that no sales were reported at lower figures, the market this week displayed a slightly weaker tendency. Nos. 1 and 2 steels were off 50c. along with allied grades. Restrictions are still in force at one mill. Another shipment of about 5000 tons has been received here on an old sale.

St. Louis

The scrap iron market in St. Louis remains steady, although quiet. The short interest of dealers has been eliminated, but they are awaiting indications of orders from the mills before taking on additional tonnages. Several mills are still restricting shipments. Several items are 50c. a ton higher.

Cincinnati

A weakening of prices in other districts is reflected in the Cincinnati market, with dealers bidding 50c. less on the average than a week ago. While there is relatively no movement of material to users, dealers generally resist any efforts at lower quotations. Some small amount of material is changing hands at current prices, but the market generally has a "marking time" appearance.

Birmingham

The market is firm. Buying is not as active as several weeks ago. Receipts are still heavy. Prices did not go as high as in other districts so are more steady. There is still a fair demand.

Detroit

Detroit scrap market is lagging in activity but apparently has reached a leveling off point in the price declines of the last two weeks. The easing in demand is accompanied by a falling off in production of scrap due to the Chrysler strike, but there is still a lot of shipping activity.

New York

The Japanese are expected to enter the market before the end of the week, but for a much smaller tonnage than was placed early in September. Owing to exigencies of war, the irregular and greatly curtailed supply of vessels for Europe and the market spurt that took place following the declaration of hostilities, some of the contracts made in May and June with the International Scrap Convention have been modified to reduce broker losses in covering them.

Boston

The undertone of the market, both for domestic delivery and export, is easier despite the fact that the movement of material is increasing rather than decreasing. The ability of exporters to secure steamer space has improved materially the past two weeks. Current softness of the export market is ascribed to congestion at loading points.

Toronto

Further price advances became effective in the Canadian iron and steel scrap markets, with the steel materials moved up 50c. to \$1 a ton. Dealers' steel was advanced \$1 a gross ton, while heavy melting steel rose 75c.; drop forge flashings and loose clippings gained 50c. and scrap pipe \$1, while other items on the list were firm, but unchanged.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

| | |
|-------------------------|--------------------|
| No. 1 hvy. mltng. steel | \$22.00 to \$23.00 |
| Railroad heavy melting | 24.50 to 25.00 |
| No. 2 heavy melting | 21.00 to 21.50 |
| Scrap rails | 24.50 to 25.00 |
| Rails 3 ft. and under | 26.50 to 27.00 |
| Comp. sheet steel | 22.00 to 23.00 |
| Hand bundled sheets | 21.00 to 22.00 |
| Heavy steel axle turn. | 20.50 to 21.00 |
| Machine shop turnings | 15.00 to 15.50 |
| Short shov. turnings | 17.50 to 18.00 |
| Mixed bor. & turn. | 14.50 to 15.00 |
| Cast iron borings | 14.50 to 15.00 |
| Cast iron carwheels | 21.50 to 22.00 |
| Heavy breakable cast. | 19.00 to 19.50 |
| No. 1 cupola cast. | 22.50 to 23.00 |
| RR. knuckles & coup. | 27.50 to 28.00 |
| Rail coil springs | 27.50 to 28.00 |
| Rail leaf springs | 27.50 to 28.00 |
| Roller steel wheels | 27.50 to 28.00 |
| Low phos. billet crops | 29.50 to 30.00 |
| Low phos. punchings | 26.00 to 26.50 |
| Low phos. heavy plate | 26.00 to 27.00 |
| Railroad malleable | 24.50 to 25.00 |

PHILADELPHIA

Per gross ton delivered to consumer:

| | |
|-------------------------|--------------------|
| No. 1 hvy. mltng. steel | \$21.50 to \$22.00 |
| No. 2 hvy. mltng. steel | 19.50 to 20.00 |
| Hydraulic bund., new | 21.50 to 22.00 |
| Hydraulic bund., old | 18.00 to 18.50 |
| Steel rails for rolling | 21.50 to 22.20 |
| Cast iron carwheels | 22.00 to 22.50 |
| Hvy. breakable cast. | 20.50 to 21.00 |
| No. 1 cast | 24.00 to 24.50 |
| Stove plate (steel wks) | 17.50 to 18.00 |
| Railroad malleable | 22.00 |
| Machine shop turn. | 14.00 to 14.50 |
| No. 1 blast furnace | 12.50 to 13.00 |
| Cast borings | 12.50 to 13.00 |
| Heavy axle turnings | 17.00 to 17.50 |
| No. 1 low phos. hvy. | 25.50 to 26.00 |
| Couplers & knuckles | 26.00 |
| Roller steel wheels | 26.00 |
| Steel axles | 24.50 to 25.00 |
| Shafting | 24.50 to 25.00 |
| Spec. iron & steel pipe | 17.00 to 17.50 |
| No. 1 forge fire | 16.50 to 17.00 |
| Cast borings (chem.) | 14.00 to 14.50 |

CHICAGO

Delivered to Chicago district consumers:

| Per Gross Ton | |
|------------------------------------|--------------------|
| Hvy. mltng. steel | \$18.25 to \$18.50 |
| Auto. hvy. mltng. steel alloy free | 17.00 to 17.50 |
| No. 2 auto steel | 14.00 to 14.50 |
| Shoveling steel | 18.00 to 18.50 |
| Factory bundles | 17.50 to 18.00 |
| Dealers' bundles | 16.50 to 17.00 |
| Drop forge flashings | 16.50 to 17.00 |
| No. 1 busheling | 17.00 to 17.50 |
| No. 2 busheling, old | 8.00 to 8.50 |
| Roller carwheels | 21.00 to 21.50 |
| Railroad tires, cut | 21.25 to 21.75 |
| Railroad leaf springs | 20.50 to 21.00 |
| Steel coup. & knuckles | 20.50 to 21.00 |
| Axle turnings | 17.00 to 17.50 |
| Coil springs | 21.50 to 22.00 |
| Axle turn. (elec.) | 19.00 to 19.50 |
| Low phos. punchings | 22.00 to 22.50 |
| Low phos. plates 12 in. and under | 21.50 to 22.00 |
| Cast iron borings | 11.00 to 11.50 |
| Short shov. turn. | 12.00 to 12.50 |
| Machine shop turn. | 11.00 to 11.50 |
| Rerolling rails | 21.00 to 21.50 |
| Steel rails under 3 ft. | 21.50 to 22.00 |
| Steel rails under 2 ft. | 22.00 to 22.50 |
| Angle bars, steel | 21.00 to 21.50 |
| Cast iron carwheels | 17.50 to 18.00 |
| Railroad malleable | 21.00 to 21.50 |
| Agric. malleable | 17.00 to 17.50 |

| Per Net Ton | |
|-----------------------|--------------------|
| Iron car axles | \$23.75 to \$24.25 |
| Steel car axles | 22.00 to 22.50 |
| Locomotive tires | 17.00 to 17.50 |
| Pipes and flues | 14.00 to 14.50 |
| No. 1 machinery cast. | 16.00 to 16.50 |
| Clean auto. cast | 16.50 to 17.00 |
| No. 1 railroad cast. | 15.50 to 16.00 |
| No. 1 agric. cast. | 14.00 to 14.50 |
| Stove plate | 12.00 to 12.50 |
| Grate bars | 12.00 to 12.50 |
| Brake shoes | 13.50 to 14.00 |

YOUNGSTOWN

Per gross ton delivered to consumer:

| | |
|-------------------------|--------------------|
| No. 1 hvy. mltng. steel | \$20.50 to \$21.00 |
| No. 2 hvy. mltng. steel | 19.00 to 19.50 |
| Low phos. plate | 23.50 to 24.00 |
| No. 1 busheling | 19.50 to 20.00 |
| Hydraulic bundles | 20.00 to 20.50 |
| Machine shop turn. | 12.50 to 13.00 |

CLEVELAND

Per gross ton delivered to consumer:

| | |
|----------------------------------|--------------------|
| No. 1 hvy. mltng. steel | \$19.00 to \$19.50 |
| No. 2 hvy. mltng. steel | 18.00 to 18.50 |
| Comp. sheet steel | 18.50 to 19.00 |
| Light bund. starapings | 15.50 to 16.00 |
| Drop forge flashings | 17.50 to 18.00 |
| Machine shop turn. | 12.00 to 12.50 |
| Short shov. turn. | 12.75 to 13.25 |
| No. 1 busheling | 18.25 to 18.75 |
| Steel axle turnings | 17.00 to 17.50 |
| Low phos. billet and bloom crops | 24.00 to 24.50 |
| Cast iron borings | 12.50 to 13.00 |
| Mixed bor. & turn. | 12.50 to 13.00 |
| No. 2 busheling | 12.50 to 13.00 |
| No. 1 cupola cast. | 21.50 to 22.00 |
| Railroad grate bars | 14.50 to 15.00 |
| Stove plate | 14.50 to 15.00 |
| Rails under 3 ft. | 24.00 to 24.50 |
| Rails for rolling | 22.75 to 23.25 |
| Railroad malleable | 21.25 to 21.75 |

BUFFALO

Per gross ton delivered to consumer:

| | |
|-------------------------|--------------------|
| No. 1 hvy. mltng. steel | \$20.50 to \$21.00 |
| No. 2 hvy. mltng. steel | 18.50 to 19.00 |
| Scrap rails | 21.00 to 21.50 |
| New hvy. b'ndled sheets | 18.50 to 19.00 |
| Old hydraul. bundles | 17.50 to 18.00 |
| Drop forge flashings | 18.50 to 19.00 |
| No. 1 bushelings | 18.50 to 19.00 |
| Machine shop turn. | 11.50 to 12.00 |
| Shov. turnings | 15.00 to 15.50 |
| Mixed bor. & turn. | 11.50 to 12.00 |
| Cast iron borings | 11.50 to 12.00 |
| Knuckles & couplers | 24.00 to 25.00 |
| Coil & leaf springs | 24.00 to 25.00 |
| Roller steel wheels | 24.00 to 25.00 |
| No. 1 machinery cast. | 20.00 to 20.50 |
| No. 1 cupola cast. | 19.00 to 19.50 |
| Stove plate | 16.00 to 16.50 |
| Steel rails under 3 ft. | 23.50 to 24.00 |
| Cast iron carwheels | 21.00 to 21.50 |
| Railroad malleable | 21.50 to 22.00 |

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

| | |
|-------------------------|--------------------|
| Selected hvy. melting | \$17.75 to \$18.25 |
| No. 1 hvy. melting | \$17.00 to \$17.50 |
| No. 2 hvy. melting | 16.00 to 16.50 |
| No. 1 locomotive tires | 18.00 to 18.50 |
| Misc. stand. sec. rails | 18.00 to 18.50 |
| Railroad springs | 21.50 to 22.00 |
| Bundled sheets | 13.00 to 13.50 |
| No. 1 busheling | 14.00 to 14.50 |
| Cast bor. & turn. | 8.00 to 8.50 |
| Machine shop turn. | 8.00 to 8.50 |
| Heavy turnings | 12.50 to 13.00 |
| Rails for rolling | 20.50 to 21.00 |
| Steel car axles | 21.00 to 21.50 |
| No. 1 RR. wrought | 12.50 to 13.00 |
| No. 2 RR. wrought | 16.50 to 17.00 |
| Steel rails under 3 ft. | 21.00 to 21.50 |
| Steel angle bars | 20.00 to 20.50 |
| Cast iron carwheels | 20.00 to 20.50 |
| No. 1 machinery cast. | 17.50 to 18.00 |
| Railroad malleable | 17.50 to 18.00 |
| No. 1 railroad cast. | 15.00 to 15.50 |
| Stove plate | 11.50 to 12.00 |
| Grate bars | 10.50 to 11.00 |
| Brake shoes | 12.50 to 13.00 |

CINCINNATI

Dealers' buying prices per gross ton at yards:

| | |
|-------------------------|--------------------|
| No. 1 hvy. mltng. steel | \$16.00 to \$16.50 |
| No. 2 hvy. mltng. steel | 14.00 to 14.50 |
| Scrap rails for mltng. | 20.50 to 21.00 |
| Loose sheet clippings | 11.50 to 12.00 |
| Hydraul. b'ndled sheets | 15.50 to 16.00 |
| Cast iron borings | 6.00 to 6.50 |
| Machine shop turn. | 7.00 to 7.50 |
| No. 1 busheling | 12.00 to 12.50 |
| No. 2 busheling | 5.00 to 5.50 |
| Rails for rolling | 21.50 to 22.00 |
| No. 1 locomotive tires | 17.50 to 18.00 |
| Short rails | 23.00 to 23.50 |
| Cast iron carwheels | 17.50 to 18.00 |
| No. 1 machinery cast. | 19.00 to 19.50 |
| No. 1 railroad cast. | 17.50 to 18.00 |
| Burnt cast | 10.25 to 10.75 |
| Stove plate | 10.25 to 10.75 |
| Agricul. malleable | 15.50 to 16.00 |
| Railroad malleable | 18.50 to 19.00 |
| Mixed hvy. cast. | 16.50 to 17.00 |

BIRMINGHAM

Per gross ton delivered to consumer:

| | |
|----------------------|------------------|
| Hvy. melting steel | \$18.00 |
| Scrap steel rails | 20.00 |
| Short shov. turnings | 9.50 |
| Stove plate | \$11.00 to 12.00 |
| Steel axles | 22.00 |
| Iron axles | 22.00 |
| No. 1 RR. wrought | 16.00 |
| Rails for rolling | 22.00 to 23.00 |
| No. 1 cast | 18.00 |
| Tramcar wheels | 18.00 |

DETROIT

Dealers' buying prices per gross ton:

| | |
|------------------------------------|--------------------|
| No. 1 hvy. mltng. industrial steel | \$15.50 to \$16.00 |
| No. 2 hvy. mltng. steel | 13.50 to 15.00 |
| Borings and turnings | 9.50 to 10.00 |
| Long turnings | 8.50 to 9.00 |
| Short shov. turnings | 12.00 to 12.50 |
| No. 1 machinery cast. | 16.00 to 16.50 |
| Automotive cast | 17.50 to 18.00 |
| Hvy. breakable cast. | 14.00 to 14.50 |
| Stove plate | 11.00 to 11.50 |
| Hydraul. comp. sheets | 17.50 to 18.00 |
| New factory bushel. | 15.00 to 15.50 |
| Sheet clippings | 13.00 to 13.50 |
| Flashings | 14.50 to 15.00 |
| Low phos. plate scrap | 16.50 to 17.00 |

NEW YORK

Dealers' buying prices per gross ton on cars:

| | |
|-------------------------|--------------------|
| No. 1 hvy. mltng. steel | \$16.50 to \$17.00 |
| No. 2 hvy. mltng. steel | 13.50 to 14.50 |
| Hvy. breakable cast. | 16.50 to 17.00 |
| No. 1 machinery cast. | 16.50 to 17.50 |
| No. 2 cast | 13.50 to 16.00 |
| Stove plate | 15.50 to 14.50 |
| Steel car axles | 19.00 to 20.00 |
| Shafting | 19.00 to 20.00 |
| No. 1 RR. wrought | 14.00 to 15.00 |
| No. 1 wrought long | 12.50 to 13.00 |
| Spec. iron & steel pipe | 13.50 to 14.00 |
| Rails for rolling | 19.00 to 20.00 |
| Clean steel turnings* | 9.00 to 10.00 |
| Cast borings* | 8.00 to 9.00 |
| No. 1 blast furnace | 8.00 to 9.00 |
| Cast borings (chem.) | Nominal |
| Unprepared yard scrap | 9.00 to 9.50 |
| Light iron | 5.00 to 5.50 |

Per gross ton, delivered local foundries:

| | |
|---------------------|--------------------|
| No. 1 machin. cast† | \$18.50 to \$19.00 |
| No. 2 cast† | 15.50 to 16.00 |

* \$1.50 less for truck loads.

† Northern N. J. prices are \$2 to \$2.50 higher

BOSTON

Dealers' buying prices per gross ton on cars:

| | |
|--------------------|--------------------|
| Breakable cast | \$14.50 to \$15.00 |
| Machine shop turn. | 8.75 to 9.00 |
| Mixed bor. & turn. | 7.25 to 7.50 |
| Bun. skeleton long | 11.75 to 12.25 |
| Shafting | 19.00 to 19.50 |
| Cast bor. chemical | 6.00 to 6.50 |

Per gross ton delivered consumers' yards:

| | |
|--------------------|--------------------|
| Textile cast | \$18.00 to \$19.00 |
| No. 1 machine cast | 18.00 to 19.00 |

Per gross ton delivered dealers' yards:

| | |
|-------------------------|--------------------|
| No. 1 hvy. mltng. steel | \$15.75 to \$16.25 |
| No. 2 steel | 14.75 to 15.25 |

PACIFIC COAST

Dealers' buying prices per gross ton on cars:

| | |
|-------------------------|---------|
| No. 1 hvy. mltng. steel | \$14.35 |
| No. 2 hvy. mltng. steel | 13.35 |

CANADA

Dealers' buying prices at these yards:

| per gross ton: | |
|-------------------------|--------------------|
| Toronto Montreal | |
| No. 1 hvy. mltng. steel | \$11.25 to \$10.75 |
| No. 2 hvy. mltng. steel | 10.00 to 9.50 |
| Mixed dealers steel | 9.25 to 8.75 |
| Drop forge flashings | 10.25 to 9.75 |
| New loose clippings | 6.50 to 6.00 |
| Busheling | 5.50 to 5.00 |
| Scrap pipe | 8.00 to 7.50 |
| Steel turnings | 6.00 to 5.50 |
| Cast borings | 5.50 to 5.00 |
| Machinery cast | 18.00 to 17.50 |
| Dealers cast | 17.00 to 16.50 |
| Stove plate | 12.00 to 11.50 |

EXPORT

Dealers' buying prices per gross ton:

| | |
|---|--------------------|
| New York, truck lots, delivered, barges | |
| No. 1 hvy. mltng. steel | \$17.00 to \$17.50 |
| No. 2 hvy. mltng. steel | 15.50 to 16.50 |
| No. 2 cast | 15.00 to 15.50 |
| Stove plate | 13.50 to 14.50 |

Boston on cars at Army Base or Mystic Wharf:

| | |
|-------------------------|--------------------|
| No. 1 hvy. mltng. steel | \$18.00 to \$18.25 |
| No. 2 hvy. mltng. steel | 17.00 to 17.25 |
| Rails (scrap) | 18.25 to 18.25 |

Philadelphia, delivered alongside boats, Port Richmond:

| | |
|-------------------------|---------|
| No. 1 hvy. mltng. steel | Nominal |
| No. 2 hvy. mltng. steel | Nominal |

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are \$2 higher. F.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton
Rerolling\$34.00
Forging quality 40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton
Open hearth or bessemer\$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.
Grooved, universal and sheared1.90c.

Wire Rods

(No. 5 to 9/32 in.)

Per Gross Ton
Pittsburgh, Chicago or Cleveland\$43.00
Worcester, Mass. 45.00
Birmingham 43.00
San Francisco 52.00
Rods over 9/32 in. or 47/64 in., inclusive, \$5 a ton over base.

SOFT STEEL BARS

Base per Lb.

Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham 2.15c.
Detroit, delivered 2.25c.
Duluth 2.25c.
Philadelphia, delivered 2.47c.
New York 2.49c.
On cars dock Gulf ports 2.50c.
On cars dock Pacific ports 2.75c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham 2.15c.
On cars dock Tex. Gulf ports 2.50c.
On cars dock Pacific ports 2.75c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows, Pt. 2.15c.
Detroit, delivered 2.25c.
On cars dock Tex. Gulf ports 2.50c.
On cars dock Pacific ports 2.60c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham 2.15c.
Detroit, delivered 2.25c.
On cars dock Tex. Gulf ports 2.50c.
On cars dock Pacific ports 2.60c.

IRON BARS

Chicago and Terra Haute 2.15c.
Pittsburgh (refined) 3.60c.

COLD FINISHED BARS AND SHAFTING*

Pittsburgh, Buffalo, Cleveland, Chicago, and Gary 2.65c.
Detroit 2.70c.

* In quantities of 10,000 to 19,999 lb.

PLATES

Base per Lb.

Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del. 2.10c. to 2.35c.
Philadelphia, del'd 2.15c. to 2.40c.
New York, del'd 2.29c. to 2.54c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.60c.
Wrought iron plates, P'tg. 3.80c.

FLOOR PLATES

Pittsburgh or Chicago 3.35c.
New York, del'd 3.71c.
On cars dock Gulf ports 3.70c.
On cars dock Pacific ports 3.95c.

STRUCTURAL SHAPES

Base per Lb.

Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham 2.10c.
Philadelphia, del'd 2.215c.
New York, del'd 2.27c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

STEEL SHEET PILING

Base per Lb.

Pittsburgh, Chicago or Buffalo 2.40c.
On cars dock Gulf ports 2.85c.
On cars dock Pacific ports 2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton\$40.00
Angle bars, per 100 lb. 2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton\$40.00
Light rails (from rail steel) per gross ton 39.00

Base per Lb.

Cut spikes 3.00c.
Screw spikes 4.55c.
Tie plates, steel 2.15c.
Tie plates, Pacific Coast ports 2.25c.
Track bolts, to steam railroads 4.15c.
Track bolts to jobbers, all sizes (per 100 counts) 65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapolis, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

Base per Lb.

Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago 2.00c.
Detroit, delivered 2.10c.
Philadelphia, delivered 2.17c.
Granite City 2.10c.
On cars dock Pacific ports 2.50c.
Wrought iron, Pittsburgh 4.10c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago 3.05c.
Detroit, delivered 3.15c.
Granite City 3.15c.
Philadelphia, delivered 3.37c.
On cars dock Pacific ports 3.65c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

From May 10 up to and including May 15, reductions from the base price of hot and cold rolled sheets running from \$4 to \$8 a ton were prevalent. Concessions withdrawn on May 15. Subsequent to May 15, many orders originally placed at \$4 to \$6 below the base price were adjusted to the full \$8 concession.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham 3.50c.
Philadelphia, del'd 3.67c.
Granite City 3.60c.
On cars dock Pacific ports 4.00c.
Wrought iron, Pittsburgh 6.10c.

Electrical Sheets (F.o.b. Pittsburgh)

Base per Lb.

Field grade 3.20c.
Armature 3.55c.
Electrical 4.05c.
Motor 4.95c.
Dynamo 5.65c.
Transformer 72 6.15c.
Transformer 65 7.15c.
Transformer 58 7.65c.
Transformer 52 8.45c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Termes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary 3.80c.
F.o.b. cars dock Pacific ports 4.50c.
Vitreous Enameling Stock, 20 Gage* Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland 3.35c.
Detroit, del'd 3.45c.
Granite City 3.45c.
On cars dock Pacific ports 3.95c.

TIN MILL PRODUCTS

*Tin Plate

Per Base Box

Standard cokes, Pittsburgh, Chicago and Gary\$5.00
Standard cokes, Granite City 5.10

* Prices effective Nov. 10 on shipments through first quarter of 1939.

Special Coated Manufacturing Termes

Per Base Box

Granite City\$4.40
Pittsburgh or Gary 4.80

Roofing Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 112 sheets, 20 x 28 in.)
8-lb. coating I.C.\$12.00
15-lb. coating I.C. 14.00
20-lb. coating I.C. 15.00
25-lb. coating I.C. 16.00
30-lb. coating I.C. 17.25
40-lb. coating I.C. 19.50

Black Plate, 29 gage and lighter

Pittsburgh, Chicago and Gary 3.05c.
Granite City 3.15c.
On cars dock Pacific ports, boxed 4.00c.

HOT ROLLED STRIP

(Widths up to 12 in.)

Base per Lb.

Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham 2.00c.
Detroit, delivered 2.10c.
On cars dock Pacific ports 2.60c.

Cooperage Stock

Pittsburgh & Chicago 2.10c.
From May 10 up to and including May 15, reductions in the base price of hot rolled strip running from \$4 to \$8 a ton were prevalent. Concessions withdrawn on May 15. Subsequent to May 15, many orders originally placed at \$4 to \$6 below the base price were adjusted to the full \$8 concession.

COLD ROLLED STRIP*

Base per Lb.

Pittsburgh, Youngstown or Cleveland 2.80c.
Chicago 2.90c.
Detroit, delivered 2.90c.
Worcester 3.00c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland 2.95c.
Detroit, delivered 3.05c.
Worcester 3.35c.

From May 10 up to and including May 15, reductions from the base price of cold rolled strip amounting to \$4 a ton were prevalent. Concessions withdrawn on May 15.

COLD ROLLED SPRING STEEL

Pittsburgh and

Cleveland Worcester
Carbon 0.26-0.50% 2.80c. 3.00c.
Carbon 0.51-0.75 4.30c. 4.50c.
Carbon 0.76-1.00 6.15c. 6.35c.
Carbon 1.01-1.25 8.35c. 8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

| | Per Lb. |
|-----------------------------|---------|
| Bright wire | 2.60c. |
| Galvanized wire, base | 2.65c.* |
| Spring wire | 3.20c. |

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

| | Base per Keg |
|---------------------------|--------------|
| Standard wire nails | \$2.55 |
| Coated nails | 2.55 |
| Cut nails, carloads | 3.70 |

| | Base per 100 Lb. |
|--|------------------|
| Annealed fence wire | \$2.90 |
| Galvanized fence wire | 3.30 |
| Twisted barless wire | 3.40 |
| Woven wire fence, No. 11 and heavier, base col. | 70 |
| Woven wire fence, lighter than No. 11, base col. | 67 |
| Single loop bale ties, base col. | 56 |
| Stand. 2 pt., 12.5 gage barbed cattle wire, per 80 rod spool. | \$2.70 |
| Stand. 2 pt., 12.5 gage barbed hog wire, per 80 rod spool. | \$2.88 |

Note: Birmingham base same on above items, except spring wire.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
F.o.b. Pittsburgh only on wrought iron pipe.

| Steel | Black Galv. | Butt Weld | Wrought Iron | Black Galv. |
|----------------|-------------|-----------|----------------|-------------|
| 1/4 in. | 56 | 36 | 1/4 in. | 56 |
| 1/2 in. | 59 | 43 1/2 | 1/2 in. | 59 |
| 3/4 in. | 62 1/2 | 54 | 3/4 in. | 62 1/2 |
| 1 in. | 66 1/2 | 60 1/2 | 1 in. | 66 1/2 |
| 1 1/4 in. | 68 1/2 | 60 1/2 | 1 1/4 in. | 68 1/2 |

| | Lap | Weld |
|-------------|-----|--------------------|
| 2 61 | 52½ | 2 30½ 15 |
| 2½ & 3.64 | 55½ | 2½ to 3½ 31½ 17½ |
| 3½ to 6.66 | 57½ | 4 33½ 21 |
| 7 & 8.65 | 55½ | 4½ to 8.32½ 20 |
| 9 & 10.64½ | 55 | 9 to 12.....28½ 15 |
| 11 & 12.63½ | 54 | |

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

| | |
|---|----------|
| F.o.b. Everett, Mass. | \$24.00. |
| F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md. | 24.00 |
| Delivered Brooklyn | 26.50 |
| Delivered Newark or Jersey City | 25.53 |
| Delivered Philadelphia | 24.84 |
| F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown.. | 23.00 |
| F.o.b. Buffalo | 23.00 |
| F.o.b. Detroit | 23.00 |
| Southern, delivered Cincinnati. | 23.06 |
| Northern, delivered, Cincinnati. | 23.44 |
| F.o.b. Duluth | 23.50 |
| F.o.b. Provo, Utah | 21.00 |
| Delivered, San Francisco, Los Angeles or Seattle | 26.50 |
| F.o.b. Birmingham* | 19.38 |

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 60c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

| | |
|---|---------|
| F.o.b. Everett, Mass. | \$23.50 |
| F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md. | 23.50 |
| F.o.b. Buffalo | 22.00 |
| F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown.. | 22.50 |
| Delivered Philadelphia | 24.34 |
| Delivered Canton, Ohio | 23.89 |
| Delivered Mansfield, Ohio | 24.44 |
| F.o.b. Birmingham | 18.00 |

Bessemer

| | |
|--|---------|
| F.o.b. Buffalo | \$24.00 |
| F.o.b. Everett, Mass. | 25.00 |
| F.o.b. Bethlehem, Birdsboro and Swedeland, Pa. | 25.00 |
| Delivered Newark or Jersey City | 26.53 |
| Erie, Pa., and Duluth | 24.00 |
| F.o.b. Neville Island, Toledo, Chicago and Youngstown .. | 23.50 |
| F.o.b. Birmingham | 24.00 |
| Delivered Cincinnati | 24.11 |
| Delivered Canton, Ohio | 24.89 |
| Delivered Mansfield, Ohio | 25.44 |

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo....\$28.50

Gray Forge

Valley or Pittsburgh furnace..\$22.50

Charcoal

| | |
|-----------------------------|---------|
| Lake Superior furnace | \$27.00 |
| Delivered Chicago | 30.34 |

Canadian Pig Iron

| Per Gross Ton | |
|--------------------|--------------|
| Montreal | |
| Foundry iron | \$27.50 base |
| Malleable | 28.00 base |
| Basic | 27.50 base |
| Toronto | |
| Foundry iron | \$25.50 base |
| Malleable | 26.00 base |
| Basic | 25.50 base |

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

| F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans. | |
|--|----------|
| Per Gross Ton | |
| Domestic, 80% (carload)..... | \$100.00 |

Spiegeleisen

| Per Gross Ton Furnace | |
|---------------------------|---------|
| Domestic, 19 to 21% | \$32.00 |
| Domestic, 26 to 28% | 39.50 |

Electric Ferrosilicon

| Per Gross Ton Delivered; Lump Size | |
|------------------------------------|----------|
| 50% (carload lots, bulk) | \$69.50* |
| 50% (ton lots in 50 gal. bbl.) .. | 80.50* |
| 75% (carload lots, bulk) | 126.00* |
| 75% (ton lots in 50 gal. bbl.) .. | 139.00* |

Bessemer Ferrosilicon

| F.o.b. Furnace, Jackson, Ohio Per Gross Ton | |
|---|---------|
| 10.00 to 10.50% | \$32.50 |
| For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton. | |
| For each unit of manganese over 2%, \$1 per ton additional. | |
| Base prices at Buffalo are \$1.25 a ton higher than at Jackson. | |

Silvery Iron

| F.o.b. Jackson, Ohio, 5.00 to 5.50% Per Gross Ton | |
|---|---------|
| 5.50% | \$26.50 |
| * For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton. The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson. | |
| Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional. | |

Ferrochrome

| Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract | |
|--|----------|
| 4 to 6% carbon | 10.50c.* |
| 2% carbon | 16.50c.* |
| 1% carbon | 17.50c.* |
| 0.10% carbon | 19.50c.* |
| 0.06% carbon | 20.00c.* |

Silico-Manganese

| Per Gross Ton, Delivered, Lump Size, Bulk, on Contract | |
|--|---------|
| 3% carbon | \$98.00 |
| 2.50% carbon | 103.00 |
| 2% carbon | 108.00 |
| 1% carbon | 118.00 |

Other Ferroalloys

| | |
|--|-------------------|
| Ferrotungsten, per lb. contained W del. carloads.... | \$2.00 |
| Ferrotungsten, 100 lbs. and less | 2.25 |
| Ferrovandium, contract, per lb. contained V., delivered | \$2.70 to \$2.90† |
| Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots | \$2.25† |
| Ferrocobaltitium, 15 to 18% Ti, 7 to 8% C. f.o.b. furnace carload and contract per net ton | \$142.50 |
| Ferrocobaltitium, 17 to 20% Ti, 3 to 5% C. f.o.b. furnace, carload and contract, per net ton | \$157.50 |
| Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton | \$58.50 |
| Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville | \$75.00 |
| Ferromolybdenum, per lb. Mo. f.o.b. furnace | 95c. |
| Calcium molybdate, per lb. Mo. f.o.b. furnace | 80c. |
| Molybdenum oxide briquettes 48-52% Mo; per lb. contained Mo, f.o.b. Langeloth, Pa. | 80c. |

* Spot prices are \$5 per ton higher.
† Spot prices are 10c. per lb. of contained element higher.

*ORES

Lake Superior Ores Delivered Lower Lake Ports

| Per Gross Ton | |
|----------------------------------|--------|
| Old range, Bessemer, 51.50%... | \$5.25 |
| Old range, non-Bessemer, 51.50% | 5.10 |
| Messabi, Bessemer, 51.50% | 5.10 |
| Messabi, non-Bessemer, 51.50% .. | 4.95 |
| High phosphorus, 51.50% | 4.85 |

Foreign Ore* C.I.f. Philadelphia or Baltimore

| Per Unit | |
|--|---------|
| Iron, low phos., copper free, 55 to 58% dry, Algeria | 12c |
| Iron, low phos., Swedish, average, 68½% iron | 12c |
| Iron, basic or foundry, Swedish, aver. 65% iron | 11c |
| Iron, basic or foundry, Russian, aver. 65% iron | Nominal |
| Man., Caucasian, washed 52% | 44c. |
| Man., African, Indian, 44-48% | 43c. |
| Man., African, Indian, 49-51% | 45c. |
| Man., Brazilian, 46 to 48% | 40c. |

| Per Short Ton Unit | |
|---|---------|
| Tungsten, Chinese, Wolframite, duty paid, delivered..\$23.00 to \$24.00 | |
| Tungsten, domestic, scheelite delivered | 25.00 |
| Chrome or (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade) | \$17.00 |
| Rhodesian, 45% | 21.00 |
| Rhodesian, 48% | 25.00 |
| Turkish, 48-49% | 26.00 |
| Turkish, 45-46% | 23.00 |
| Turkish, 40-41% | 18.50 |
| Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton: 50% | \$26.00 |
| 48-49% | 25.00 |

* All foreign ore prices are nominal

FLUORSPAR

| Per Net Ton | |
|--|--------------------|
| Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail | \$22.00 |
| Domestic, f.o.b. Ohio River landing barges | \$22.00 |
| No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines..\$20.00 to \$22.00 | |
| Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid | \$22.50 to \$23.50 |
| Domestic No. 1 ground bulk, 96 to 98% calcium fluoride, not over 2¼% silicon, f.o.b. Illinois and Kentucky mines | \$31.60 |

FUEL OIL

| Per Gal. | |
|-----------------------------------|---------|
| No. 2, f.o.b. Bayonne, N. J. | 4.375c. |
| No. 6, f.o.b. Bayonne, N.J. | 2.74c. |
| No. 5 Bur. Stds., del'd Chicago | 3.25c. |
| No. 6 Bur. Stds., del'd Chicago | 2.75c. |
| No. 3 distillate, del'd Cleve'd. | 5.375c. |
| No. 4 industrial, del'd Cleve'd. | 5.125c. |
| No. 5 industrial, del'd Cleve'd. | 4.25c. |
| No. 6 industrial, del'd Cleve'd. | 4.00c. |

COKE

| Per Net Ton | |
|--|------------------|
| Furnace, f.o.b. Connells-ville, Prompt | \$5.00 to \$5.50 |
| Foundry, f.o.b. Connells-ville, Prompt | 5.75 to 6.25 |
| Foundry, by - product Chicago ovens | 10.25 |
| Foundry, by - product del'd New England... | 12.50 |
| Foundry, by - product del'd Newark or Jersey City | 11.38 to 11.90 |
| Foundry, by - product Philadelphia | 11.45 |
| Foundry, by - product delivered Cleveland .. | 10.30 |
| Foundry, by - product delivered Cincinnati .. | 9.75 |
| Foundry, Birmingham .. | 7.50 |
| Foundry, by - product del'd St. Lois industrial district | 10.75 to 11.00 |
| Foundry, from Birmingham, f.o.b. cars dock Pacific ports | 14.75 |

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

| | Base per Lb. |
|---|--------------|
| Plates | 3.40c. |
| Shapes | 3.40c. |
| Soft steel bars and small shapes | 3.35c. |
| Reinforcing steel bars | 2.70c. |
| Cold finished bars and screw stock | 3.65c. |
| Hot rolled strip | 3.60c. |
| Hot rolled sheets | 3.35c. |
| Galv. sheets (24 ga.) 500 lb. to 1499 lb. | 4.75c. |
| Wire, black, soft annealed | 3.15c. |
| Wire, galv., soft | 3.55c. |
| Track spikes (1 to 24 kegs) | 3.60c. |
| Wire nails (in 100-lb. kegs) | 2.65c. |

On plates, structurals, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb. On reinforcing bars base applies to orders of less than one ton and includes switching and setting charge. All above prices for delivery within the Pittsburgh switching district.

NEW YORK

| | Base per Lb. |
|--|-------------------|
| Plates, 1/4 in. and heavier | 3.76c. |
| Structural shapes | 3.75c. |
| Soft steel bars, round | 3.84c. |
| Iron bars, Swed. char-coal | 9.50c. |
| Cold-fin. shafting and screw stock: | |
| Rounds, squares, hexagons | 4.09c. |
| Flats up to 12 in. wide | 4.09c. |
| Cold-rolled strip and quarter hard | 3.51c. |
| Hot-rolled strip, soft O.H. | 3.96c. |
| *Hot-rolled sheets (8-30 ga.) | 3.58c. |
| *Galv. sheets (24 ga.) | 4.74c. |
| Long ternes (24 ga.) | 5.50c. |
| Cold-rolled sheets (20 ga.) | |
| Standard quality | 4.60c. |
| Deep drawing | 4.85c. |
| Stretcher leveled | 5.10c. |
| SAE, 2300, hot-rolled | 7.35c. |
| SAE, 3100, hot-rolled | 6.90c. |
| SAE, 6100, hot-rolled annealed | 8.75c. |
| SAE, 2300, cold-rolled | 8.59c. |
| SAE, 3100, cold-rolled, annealed | 8.19c. |
| Floor plate, 1/4 in. and heavier | 5.66c. |
| Standard tool steel | 12.50c. |
| Wire, black, annealed (No. 9) | 4.35c. |
| Wire, galv. (No. 9) | 4.70c. |
| Open-hearth spring steel | 5.20c. to 10.20c. |
| Common wire nails, per keg in lots of one to nine kegs | 3.10c. |

* For lots less than 2000 lb.
** For lots of 1500 lb. or more.

CHICAGO

| | Base per Lb. |
|---|--------------|
| Plates and structural shapes | 3.55c. |
| Soft steel bars, rounds and angles | 3.50c. |
| Soft steel squares, hexagons, channels and Tees | 3.65c. |
| Hot rolled strip | 3.60c. |
| Floor plates | 5.15c. |
| Hot rolled sheets | 3.35c. |
| Galvanized sheets | 4.85c. |
| Cold rolled sheets | 4.30c. |
| Cold finished carbon bars | 3.75c. |
| Above prices are subject to deductions and extras for quantity and are f.o.b. consumer's plant within Chicago free delivery zone. | |

CLEVELAND

| | Base per Lb. |
|------------------------------------|--------------|
| Plates | 3.40c. |
| Structural shapes | 3.58c. |
| Soft steel bars | 3.25c. |
| Cold-fin. bars (1500 lb., over.) | 3.75c. |
| Hot-rolled strip | 3.50c. |
| Cold rolled sheets | 4.55c. |
| Cold-finished strip | 3.20c. |
| Galvanized sheets (No. 24) | 4.62c. |
| Hot-rolled sheets | 3.35c. |
| Floor plates, 3/16 in. and heavier | 5.18c. |
| *Black ann'l'd wire, per 100 lb. | \$3.10 |
| *No. 9 galv. wire, per 100 lb. | 3.50 |
| *Com. wire nails, base per keg | 2.75 |
| Hot rolled alloy steel (3100) | 5.85c. |
| Cold rolled alloy steel (3115) | 6.75c. |

* For 5000 lb. or less.
Prices shown on hot rolled bars, strip, sheets, shapes and plates are for 400 to 1999 lbs. Alloy steel, 1000 lb. and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 400 to 1499 lb.

ST. LOUIS

| | Base per Lb. |
|---|--------------|
| Plates and structural shapes | 3.47c. |
| Bars, soft steel (rounds and flats) | 3.62c. |
| Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds) | 3.77c. |
| Cold fin. rounds, shafting, screw stock | 4.02c. |
| Galv. sheets (24 ga.) | 4.52c. |
| Hot rolled sheets | 3.38c. |
| Galv. corrugated sheets, 24 ga. and heavier* | 4.57c. |
| Structural rivets | 5.02c. |

* No. 26 and lighter take special prices.

BOSTON

| | Base per Lb. |
|--|--------------|
| Structural shapes, 3 in. and larger | 3.85c. |
| Plates, 1/4 in. and heavier | 3.85c. |
| Bars | 3.88c. |
| Heavy hot rolled sheets | 3.71c. |
| Hot rolled sheets | 4.21c. |
| Hot rolled annealed sheets | 4.61c. |
| Galvanized sheets | 4.61c. |
| Cold rolled sheets | 4.71c. |
| The following quantity differentials apply: Less than 100 lb., plus \$1.50 per 100 lb.; 100 to 399 lb. plus 50c.; 400 to 1999 lb. base; 2000 to 9999 lb. minus 20c.; 10,000 to 39,999 lb. minus 30c.; 40,000 lb. and over minus 40c. | |

BUFFALO

| | Base per Lb. |
|---|--------------|
| Plates | 3.62c. |
| Floor plates | 5.25c. |
| Struc. shapes | 3.40c. |
| Soft steel bars | 3.35c. |
| Reinforcing bars (20,000 lb. or more) | 2.15c. |
| Cold-fin. flats, squares, rounds, and hex. | 3.65c. |
| Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl., also sizes No. 8 to 30 ga. | 3.35c. |
| Galv. sheets (24 ga.) | 4.70c. |
| Bands and hoops | 3.32c. |

NEW ORLEANS

| | Base per Lb. |
|-----------------------------------|--------------|
| Mild steel bars | 4.20c. |
| Reinforcing bars | 3.24c. |
| Structural shapes | 4.10c. |
| Plates | 4.10c. |
| Hot-rolled sheets, No. 10 | 4.35c. |
| Steel bands | 4.75c. |
| Cold-finished steel bars | 5.10c. |
| Structural rivets | 4.85c. |
| Boiler rivets | 4.85c. |
| Common wire nails, base per keg | 3.55 |
| Bolts and nuts, per cent off list | 60 |

REFRACTORIES PRICES

| Fire Clay Brick | |
|---|---------|
| Per 1000 f.o.b. Works | |
| Super-duty brick, at St. Louis | \$60.80 |
| First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois | 47.50 |
| First quality, New Jersey | 52.50 |
| Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois | 42.75 |
| Second quality, New Jersey | 49.00 |
| No. 1 Ohio | 39.90 |
| Ground fire clay, per ton | 7.10 |
| Silica Brick | |
| Per 1000 f.o.b. Works | |
| Pennsylvania | \$47.50 |
| Chicago District | 55.10 |
| Birmingham | 47.50 |
| Silica cement per net ton (East-ern) | 8.55 |
| Chrome Brick | |
| Net per Ton | |
| Standard f.o.b. Baltimore, Plymouth Meeting and Chester | \$47.00 |
| Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa. | 47.00 |
| Magnesite Brick | |
| Net per Ton | |
| Standard f.o.b. Baltimore and Chester | \$67.00 |
| Chemically bonded, f.o.b. Baltimore | 57.00 |
| Grain Magnesite | |
| Net per Ton | |
| Imported, f.o.b. Baltimore and Chester, Pa. (in sacks) | \$45.00 |
| Domestic, f.o.b. Baltimore and Chester in sacks | 40.00 |
| Domestic, f.o.b. Chewelah, Wash. (in bulk) | 22.00 |

PHILADELPHIA

| | Base per Lb. |
|--|--------------|
| *Plates, 1/4-in. and heavier | 3.55c. |
| *Structural shapes | 3.55c. |
| *Soft steel bars, small shapes, iron bars (except bands) | 3.35c. |
| †Reinforc. steel bars, square and deformed | 2.76c. |
| Cold-finished steel bars | 4.16c. |
| *Steel hoops | 4.35c. |
| *Steel bands, No. 12 and 3/16 in. incl. | 3.85c. |
| *Spring steel | 5.00c. |
| †Hot-rolled anneal. sheets | 3.55c. |
| †Galvanized sheets (No. 24) | 4.63c. |
| *Diam. pat. floor plates, 1/4 in. | 5.25c. |

*For quantities between 400 and 1999 lb.
†For 10 bundles or over.
‡For one to five tons.

BIRMINGHAM

| | Base per Lb. |
|---|-------------------|
| Bars and bar shapes | 3.50c. |
| Structural shapes and plates | 3.55c. |
| Hot rolled sheets No. 10 ga. | 3.35c. |
| Galvanized sheets No. 24 ga. | 4.75c. |
| or more | |
| Strip | 3.60c. |
| Reinforcing bars | 3.50c. |
| Floor plates | 5.58c. |
| Cold finished bars | 4.43c. |
| Machine and car-riage bolts | .50 & 10 off list |
| Rivets (structural) | \$4.60 base |
| On plates, shapes, bars, hot-rolled strip, heavy hot-rolled sheets, the base applies on 400 to 1999 lb. All prices are f.o.b. consumer plant. | |

PACIFIC COAST

| | San Francisco | Los Angeles | Seattle |
|---|---------------|-------------|---------|
| Plates, tanks and U. M. | 4.00c. | 3.80c. | 3.40c. |
| Shapes, standard | 4.00c. | 3.80c. | 3.50c. |
| Soft steel bars | 4.00c. | 3.95c. | 4.00c. |
| Reinforcing bars, f.o.b. cars dock | | | |
| Pacific ports | 2.525c. open. | 2.975c. | |
| Hot-rolled sheets (No. 10) | 3.75c. | 4.00c. | 3.70c. |
| Galv. sheets (No. 24 and lighter | 5.15c. | 5.00c. | 4.75c. |
| Galv. sheets (No. 22 and heavier) | 5.40c. | 5.00c. | 4.75c. |
| Cold-finished steel | | | |
| Rounds | 6.80c. | 6.60c. | 7.10c. |
| Squares and hexagons | 8.05c. | 7.85c. | 7.10c. |
| Flats | 8.55c. | 8.35c. | 8.10c. |
| Common wire nails—base per keg less carload | 3.25c. | 3.25c. | 3.15c. |

All items subject to differentials for quantity.

ST. PAUL

| | Base per Lb. |
|------------------------------------|--------------|
| Mild steel bars, rounds | 4.10c. |
| Structural shapes | 4.00c. |
| Plates | 4.00c. |
| Cold-finished bars | 4.83c. |
| Hot-rolled annealed sheets, No. 24 | 4.75c. |
| Galvanized sheets, No. 24 | 5.00c. |

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

DETROIT

| | Base per Lb. |
|---|--------------|
| Soft steel bars | 3.33c. |
| Structural shapes | 3.65c. |
| Plates | 3.60c. |
| Floor plates | 5.27c. |
| Hot-rolled sheets, 8 to 30 gages above 12 in. and 3/16 in., 24 in. to 48 in. wide | 3.43c. |
| Cold-rolled sheets | 4.50c. |
| *Galvanized sheets | 4.59c. |
| Hot-rolled strip, under No. 12 | 3.68c. |
| Hot-rolled strip, No. 12 and over | 3.43c. |
| Cold-finished bars | 3.80c. |
| Cold-rolled strip | 3.55c. |
| Hot-rolled alloy steel (SAE 3100 Series) | 5.97c. |
| Cold-rolled alloy (SAE 2300) | 8.45c. |

Quantity extras apply to all items.
*Price applies only in metropolitan Detroit.

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

Lear Developments, Inc., 24 State Street, New York, aerial radio equipment, parts, etc., has taken over property at Dayton, Ohio, and will remove present works at Garden City, L. I., to that location, expanding capacity.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 3 for one precision engine lathe (Schedule 7513) for New York; until Oct. 31, ventilation heaters and spare parts (Schedule 7496); until Nov. 3, temperature control valves for reheaters and preheaters (Schedule 7498) for Brooklyn and Philadelphia yards; aircraft blades and hubs (Schedule 900-2842), two test stands (Schedule 3579), one motor-driven double-housing planer (Schedule 2522), two double-housing motor-driven planers (Schedule 7504), aircraft engine-driven fuel pumps (Schedule 7536); until Nov. 7, 200 to 700 check valves (Schedule 7537) for Philadelphia yard.

Board of Education, Park Avenue and Fifty-ninth Street, New York, has approved plans for new five-story and basement vocational school, 198 x 348 ft., at 51-79 Fountain Avenue, East New York. Cost about \$1,975,000 with equipment. Bureau of Construction, 49 Flatbush Avenue Extension, Brooklyn, is in charge. Eric Kebben, last noted address, is architect for board.

National Biscuit Co., 449 West Fourteenth Street, New York, has let general contract to R. A. Smallman Co., 1109 Fifth Avenue South, Birmingham, for one-story branch plant at Fourteenth Street and Avenue A, Birmingham. Cost close to \$100,000 with mixers, traveling ovens, conveyors and other mechanical equipment.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until Oct. 31 for gages (Circular 177); until Nov. 1, steel drop forgings (Circular 181); until Nov. 3, two precision bench lathes (Circular 165); until Nov. 7, six metal shaping machines (Circular 173).

American Brake Shoe & Foundry Co., 230 Park Avenue, New York, will begin work soon on one-story addition to branch plant at 1673 Bailey Avenue, Buffalo, 25 x 110 ft., for foundry extension. Cost over \$60,000 with equipment.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until Nov. 3 for tape pullers and rewinder reels, keying head drives, motor-generator units, recorder control boxes and other equipment (Circular 108); until Nov. 10 for line connector units, time interval equipment, etc. (Circular 116).

Wright Aeronautical Corp., Paterson, N. J., airplane engines and parts, plans one-story addition, about 300,000 sq. ft. of floor space, on adjoining tract of about 17 acres; also several smaller units for expansion in different departments. Cost reported in excess of \$1,000,000 with equipment.

Johnson & Johnson, Inc., George Street, New Brunswick, N. J., chemicals, drugs, etc., has acquired about 160 acres on Highway 25, near New Brunswick, for new plant, consisting of a large one and multi-story structure, with several smaller units, power house, shops and other buildings. Cost close to \$750,000 with equipment. Russell G. Cory, 30 Church Street, New York, is engineer.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Oct. 30 for 180,000 pieces of metal tubing (Circular 498); until Nov. 1 for one borer (Circular 534).

Bureau of Yards and Docks, Navy Department, Washington, has let general contract to Ralph S. Herzog, Inc., 1505 Race Street, Philadelphia, for one-story sub-assembling shop, 100 x 600 ft., at Philadelphia Navy Yard,

at \$337,167 exclusive of equipment (Specifications 9331).

Pennsylvania Power & Light Co., Allentown, Pa., plans addition to steam-electric generating station at Harrisburg, Pa., with installation of new 20,000-kw. turbo-generator unit and accessories, two high-pressure boilers and auxiliary equipment. Work is scheduled to begin this fall. Cost close to \$3,000,000 with equipment.

Commanding Officer, Ordnance Department, Frankford Arsenal, Bridesburg, Philadelphia, asks bids until Oct. 31 for one floor-operated electric traveling crane (Circular 495).

◀ BUFFALO DISTRICT ▶

L. C. Smith & Corona Typewriter, Inc., 701 East Washington Street, Syracuse, N. Y., typewriters and parts, plans one-story addition to branch plant at Groton, N. Y. Cost close to \$50,000 with equipment.

American Ship Building Co., foot of West Fifty-fourth Street, Cleveland, has acquired plant of Lake Erie Shipbuilding Co., Inc., foot of Michigan Avenue, Buffalo, also branch yard of company at 902 Water Street, Toledo, Ohio, and will improve for branch shipbuilding and repair plants.

Revere Copper & Brass, Inc., Rome Mfg. Co. Division, Rome, N. Y., has approved plans for one-story addition, about 80 x 240 ft. Cost over \$75,000 with equipment.

◀ NEW ENGLAND ▶

Armstrong Rubber Co., 475 Elm Street, West Haven, Conn., manufacturer of automobile tires and tubes, will take bids soon on general contract for four-story addition, 100 x 180 ft. Cost close to \$200,000 with equipment. Fletcher-Thompson, Inc., 1336 Fairfield Avenue, Bridgeport, Conn., is architect and engineer.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Oct. 30 for nine drop board hammers (Circular 105), one boring and reaming machine, one boring machine, one pantograph air-driven router and three vertical spindle high-speed routers (Circular 111); until Nov. 1, continuous hardening and tempering furnace (Circular 117); until Nov. 2, one chambering machine (Circular 116).

Holo-Krome Screw Corp., Brooks Street, Elmwood, Hartford, Conn., socket head screws, socket wrench sets, etc., has let general contract to R. G. Bent Co., 93 Edwards Street, for two one-story additions, 66 x 123 ft., and 16 x 65 ft. respectively. Cost over \$50,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Nov. 8 for four wall cranes, each 3-ton capacity, for Boston and Portsmouth, N. H., Navy yards (Specifications 9461).

Bird & Son, Inc., Washington Street Extension, East Walpole, Mass., roofing and building papers, etc., has let general contract to MacDonald & Belbin, Inc., 88 Broad Street, Boston, for one-story addition for storage and distribution. Cost about \$45,000 with equipment.

◀ WASHINGTON DIST. ▶

Commanding Officer, Ordnance Department, Curtis Bay, Baltimore, asks bids until Oct. 31 for two fork-type lift trucks (Circular 5).

Fairfield-Western Dairy Corp., 1125 Linden Avenue, Baltimore, has let contract to Stone & Webster Engineering Corp., Boston, and 5300 Holabird Avenue, Baltimore, for design and construction of new milk and milk by-products plant on 10-acre tract at Loch Raven Road and Baltimore & Ohio Railroad, consisting of a main one and two-story unit, with

power house, machine shop and other buildings. Cost about \$1,500,000 with equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until Oct. 30 for two six-ton trolleys, 24 post hole digging shovels, copper tubing (Schedule 3669); until Oct. 31, one motor-generator set, generator switchboard, transformers, etc. (Schedule 3661); until Nov. 2, steel tank, all-riveted construction (Schedule 3671), gasoline engine-driven core drill (Schedule 3674), wrought iron pipe and fittings, brass or bronze elbows, 32 fire hydrants, 12,875 sq. head rough steel machine bolts (Schedule 3673); until Nov. 3 for lead pipe, 700 ft. of ungalvanized close link coil chain, and 4000 ft. of similar chain, galvanized (Schedule 3676).

Virginia Public Service Generating Co., 117 South Washington Street, Alexandria, Va., recently organized subsidiary of Virginia Public Service Co., same address, plans new steam-electric generating plant on local site, installation to include 15,000-kw. turbine-generator unit and accessories, high-pressure boilers and auxiliary equipment. Cost over \$2,500,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 31 for 19 diesel engine units and 10 sets of spare parts (Schedule 7490) for Boston Navy Yard; steel wire nails (Schedule 7491) for Eastern and Western yards; seamless copper tubing (Schedule 7510) for Washington yard; until Nov. 3, two motor-driven milling machines (Schedule 7516) for Norfolk yard; one electric crane truck (Schedule 7503) for Sewall's Point, Va.; one motor-driven combination contour metal-sawing, filing and polishing machine with equipment (Schedule 7505) for Quantico, Va., yard.

◀ SOUTH ATLANTIC ▶

Boyce Weavers Knotters, Inc., Gastonia, N. C., textile mill machinery and parts, plans two or more one-story additions for increase in parts manufacture and assembling divisions. Cost close to \$40,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 3 for one electric gasoline engine-driven welding set (Schedule 7512) for Charleston, S. C., yard.

Duke Power Co., Charlotte, N. C., has approved plans for new steam-electric generating plant at Dukeville, N. C., comprising second unit of company power station in that area. Installation will include turbine-generator units with capacity of 100,000-hp., high-pressure boilers and auxiliary equipment. Cost close to \$5,000,000. Extensions will be made in transmission and distributing lines in district noted.

◀ SOUTH CENTRAL ▶

Harpeth Valley Chemical Co., Warner Building, Nashville, Tenn., industrial chemicals, plans new phosphate plant at Franklin, Tenn., where phosphate rock properties are available. It will consist of several one-story units, with storage and distributing facilities, boiler house, machine shop and other mechanical departments. Cost over \$80,000 with equipment.

Yazoo Refining Co., Yazoo City, Miss., W. C. Kruger, Fort Worth, Tex., president, recently organized, plans local oil refinery on about 50-acre tract fronting on line of Yazoo & Mississippi Valley Railroad. It will consist of main production unit, steel tank storage facilities, power house, pumping station, machine shop and other structures. Cost close to \$150,000 with machinery. Work will begin soon.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until Nov. 2 for rubber-insulated wire and cable for control and lighting circuits at Wheeler switchyard; until Nov. 6 for galvanized steel transmission towers for transmission line from Hiwassee to Chickamauga Dam.

◀ SOUTHWEST ▶

Stearman Aircraft Co., R. D. No. 5, Wichita, Kan., near municipal airport, has let general contract to 'Armagost & Son, Kauffman Building, for several one-story units for parts production and assembling. Cost about \$200,000

with equipment. Overend & Boucher, Brown Building, are architects; Godfrey Hartwell, 1047 West River Street, is engineer.

Meyer Kornblum Packing Co., 300 Central Avenue, Kansas City, Kan., meat packer, has asked bids on general contract for two-story and basement addition, 50 x 120 ft. Cost over \$65,000 with equipment. Carl Schloemann, 6329 San Bonita Avenue, Clayton, St. Louis, is architect.

Lone Star Cement Co., Houston, Tex., plans one-story addition to mill in Manchester district, 80 x 240 ft., for storage and distribution; also improvements and extensions in other departments, with installation of mechanical-handling and other equipment. Cost close to \$150,000 with machinery.

Lockhart Oil Co., Milam Building, San Antonio, Tex., has let contract to Petroleum Engineering Co., Inc., Kennedy Building, Tulsa, Okla., for new gas recycling plant and separator unit at oil properties near Agua Dulce, Tex. Cost over \$200,000 with equipment.

Commanding Officer, Ordnance Department, San Antonio Arsenal, San Antonio, Tex., asks bids until Nov. 6 for threading set (Circular 16); until Nov. 9, wrenches, pliers and tool holders, etc. (Circular 18); until Nov. 10, one electrical hoist and spare parts (Circular 19).

City Council, San Augustine, Tex., will take bids soon for extensions and improvements in municipal power plant, including new 300-kw. diesel engine-generator unit and auxiliary equipment. H. B. Gieb, Mercantile Building, Dallas, Tex., is consulting engineer.

◀ WESTERN PA. DIST. ▶

Aero Supply Mfg. Co., 611 East Main Street, Corry, Pa., screw products for aircraft, has asked bids on general contract for one-story and basement addition, 60 x 80 ft. Cost close to \$40,000 with equipment. Fred A. Fuller, Commercial Building, is architect.

United States Engineer Office, Huntington, W. Va., asks bids until Nov. 2 for two air compressors (Circular 71).

Carnegie-Illinois Steel Corp., Pittsburgh, has engaged Stone and Webster Engineering Corp., Boston, and Union Trust Building, Pittsburgh, to design and supervise construction of new steam-electric power plant at Carrie Furnace, Rankin, Pa., with capacity of 32,000-kw. Installation will include turbine-generator units, high-pressure boilers with rating of 450,000 lb. of steam per hr., to use blast furnace gas or pulverized coal for fuel, and auxiliary equipment.

United States Engineer Office, New Post Office Building, Pittsburgh, asks bids until Nov. 6 for five crest gates, each with dogging devices; also for spare parts for gates (Circular 270).

◀ OHIO AND INDIANA ▶

Federal Foundry Supply Co., 4600 East Seventy-first Street, Cleveland, has let general contract to Sam W. Emerson Co., 1836 Euclid Avenue, for one-story addition. Cost close to \$40,000 with equipment.

Cincinnati Butchers Supply Co., 2145 Central Parkway, Cincinnati, refrigerators, fixtures and other store equipment, has taken over former plant of Worthington Pump & Machinery Corp., Elmwood Place district, and will modernize and expand for new plant, including one-story wing addition, 60 x 360 ft., for increased production facilities, new office building, boiler house and other structures. Cost over \$125,000 with equipment. George McDonald, Fountain Square Building, is architect.

Barmatic Products Co., 13605 Union Avenue, Cleveland, screw machine products, plans one-story addition, 50 x 87 ft., for a machine shop. Cost close to \$40,000 with machinery. Gustave J. Stipek, 12502 Gay Avenue, is architect.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Oct. 30 for 300 strain gages (Circular 419), voltmeters, ammeters, etc. (Circular 422), cylinder gages (Circular 421); until Oct. 31, 60 sets of windlass parts (Circular 418), brass, copper and steel wire (Circular 420); until Nov. 1, one pantograph machine and

parts (Circular 432), one electric dynamometer, 4-hp. rating (Circular 427); until Nov. 2, parts for airplanes (Circular 407), 26 hand tachometers (Circular 435), 15 oil temperature regulators (Circular 426); until Nov. 3, 321 hand air pumps (Circular 441); until Nov. 6, chrome molybdenum steel tubing and chrome nickel corrosion resistant steel tubing (Circular 431).

R. H. Freitag Mfg. Co., Akron, Ohio, dies, molds, etc., for rubber mills and other industries, has let general contract to J. L. Hunting Co., Ninth and Chester Building, Cleveland, for one-story addition, 50 x 145 ft. Cost close to \$45,000 with equipment. W. H. Hatch, Hippodrome Building, Cleveland, is architect and engineer.

Board of Public Works, Fort Wayne, Ind., plans expansion and improvements in municipal power plant, including new 15,000-kw. turbo-generator unit and auxiliary equipment. Bids for equipment will be asked soon, and for station construction early in 1940. Cost about \$560,000.

◀ MICHIGAN DISTRICT ▶

Timken-Detroit Axle Co., 100 Clark Avenue, Detroit, has let general contract to Barton-Malow Co., 1900 East Jefferson Avenue, for one-story addition, and modernization and improvements in present plant. Cost about \$50,000 with equipment.

L. A. Young Spring & Wire Corp., 9200 Russell Street, Detroit, mechanical springs, steel wire products, etc., plans one-story addition, 53 x 400 ft., to factory branch, storage and distributing plant at 3200 East Slauson Avenue, Vernon, Los Angeles. Cost over \$65,000 with equipment.

Chevrolet Gray Iron Foundry Division, General Motors Corp., Saginaw, Mich., has let general contract to Spence Brothers, Saginaw, for one-story addition for expansion in main foundry. Cost over \$50,000 with equipment.

◀ MIDDLE WEST ▶

Pilsen Brewing Co., 3049 West Twenty-sixth Street, Chicago, has asked bids on general contract for two-story addition, 46 x 100 ft., for a mechanical-bottling unit. Cost close to \$50,000 with equipment. Smith, Brubacker & Egan, 30 North LaSalle Street, are architects.

Signal Corps Procurement District, 1819 West Pershing Road, Chicago, asks bids until Nov. 1 for relay racks, testing equipment sets, power boards, dynamotor ringing machines, etc. (Circular 62).

Bartlett Trailer Co., 3830 South Michigan Avenue, Chicago, motor trailers and parts, plans two-story addition, for which architect will be selected soon to prepare detailed plans. Cost over \$40,000 with equipment.

Rath Packing Co., 1600 Sycamore Street, Waterloo, Iowa, meat packer, has let general contract to Currie & Wilde Construction Co., Park Road, Waterloo, for new one-story and basement factory branch, storage and distributing plant, 90 x 183 ft., at Decatur, Ill. Cost close to \$90,000 with equipment. John S. Bartley, first noted address, is company architect.

Milwaukee Railroad, Union Station, Chicago, will take bids soon on general contract for extensions and improvements in wheel foundry and other shop units at car shops, West Milwaukee. Award for foundations has been let to Lupinski, Inc., North First Street and East Capitol Drive, Milwaukee. Cost about \$115,000, larger part of which will be used for equipment purchases. R. J. Middleton, first noted address, is assistant chief engineer.

Iowa Electric Light & Power Co., Cedar Rapids, Iowa, plans expansion and improvements in local steam-electric generating station, including new equipment. An award for high-pressure boiler unit has been made and contracts for other equipment will be placed soon. Actual work is scheduled to begin early next spring. Cost about \$900,000 with machinery.

Hein-Werner Motor Parts Corp., 1200 National Avenue, Waukesha, Wis., has let general contract to William F. Tubising Co., 8011 Chestnut Street, Wauwatosa, Wis., for one-story and basement addition, 50 x 75 ft., for

expansion in assembling division. Cost close to \$40,000 with equipment.

W. B. Gambill Distilling Co., Crandon, Wis., is completing plans for two-story bottling plant. Foeller, Schober & Berners, Green Bay, Wis., are architects.

◀ PACIFIC COAST ▶

Vultee Aircraft Co., Downey, Cal., airplanes and parts, plans one-story addition, about 25,000 sq. ft. of floor space, for expansion in parts, assembling and engineering divisions. Cost over \$75,000 with equipment. Gordon B. Kaufmann, 627 South Carondelet Street, Los Angeles, is architect.

City Council, Ventura, Cal., is considering new steam-electric municipal power plant. Cost close to \$1,200,000 and bond issue in that amount will be voted at general election, Nov. 7.

Bureau of Reclamation, Denver, asks bids until Nov. 3 for two slide gates and two motor-operated gate hoists, 13,700-lb. capacity, for turn-out structure for wasteway No. 3, Yakima Ridge Canal, Roza Division, Yakima, Wash. (Specifications 1296-D); until Nov. 7, six cast steel draft tube pier noses for Parker power plant, Parker Dam power project, Arizona-California (Specifications 1297-D).

Bohemian Distributing Co., 2254 East Fortyninth Street, Vernon, Los Angeles, has filed plans for one-story addition to winery. Cost close to \$40,000 with equipment. Hugo Eckart, 1015 East Eighth Street, Los Angeles, is engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 31 for two electric furnaces, two steel quench tanks, two gas-fired furnaces (Schedule 7472), one electric furnace and one steel quench tank (Schedule 7468), one degreasing motor-driven pumping unit (Schedule 7430) for Alameda, Cal., naval air station; one steam windlass, with spare parts (Schedule 7441); until Nov. 3, motor-driven pumps, spare parts, tools and wrenches (Schedule 7486) for Mare Island Navy Yard; rough machined steel forgings (Schedule 7493) for Puget Sound yard; one gas-fired furnace and one steel quench tank (Schedule 7470) for Alameda station; 50 landing gear wheels for aircraft (Schedule 900-2845) for San Diego naval air station; until Nov. 7, electric cable (Schedule 7487); until Nov. 10, one laboratory-type electric oven (Schedule 7500) for Mare Island yard.

City Council, Ogden, Utah, plans new municipal steam-electric power plant, including electric transmission and distributing lines. Cost about \$3,000,000. Bond issue in that amount will be voted at general election, Nov. 7.

◀ FOREIGN ▶

Ditta "Silva" S.A., Resine Trementine Venite, Bolzano, Italy, manufacturer of industrial chemicals, plans new works for production of essential oils, turpentine, rosin and affiliated naval stores. Cost over \$300,000 with equipment.

Fairchild Aircraft, Ltd., Longueuil, Que., airplanes and parts, has let general contract to Sutherland Construction Co., Ltd., 11440 Ste. Catherine Street West, Montreal, for two-story and basement addition, 120 x 180 ft. Cost close to \$100,000 with equipment. T. Pringle & Son, Ltd., 485 McGill Street, Montreal, is architect.

National Steel Car Co., Ltd., Montreal, plans additions to plant of its Aircraft Division, Malton, Ont., for parts production and assembling, to more than double present capacity.

Wickwire Spencer Steel Co., and wholly owned subsidiaries, in the quarter ended Sept. 30, operated at a loss of \$52,661, contrasted with a loss of \$137,643 in the like 1939 period, and a loss of \$149,100 in the June 30 quarter, this year. The indicated loss for the nine months ended with September is \$360,514 contrasted with a deficit of \$587,481 in the like 1938 period.

THIS WEEK'S MACHINE ... TOOL ACTIVITIES ...

Hysterical Rush Over Cincinnati Builders Report

CINCINNATI—While the pace of ordering has slowed down, current business is still of substantial proportions. Some business from England and France continues to come in, but the bulk of current business has now become domestic. A substantial Russian order is still pending in the market and is expected to be placed within the very near future. It is difficult to make a reasonably accurate estimate of the percentage of current demand to capacity, although machine tool builders in this area report that ordering is still very close to capacity. Delivery problems are accredited as one of the major causes of the more conservative ordering, although, of course, a fairly important cause is the fact that a substantial number of tool users have now specified for at least their pressing retooling requirements. Deliveries are now pretty well extended, with some plants making no promises of delivery before next August on current inquiry. Some conception of the rapidity of the demand during the preceding weeks is indicated by a statement of one manufacturer that his concern had received as many orders in three weeks as they would normally receive in six months.

While normal day operations and present restricted night operations are being supplied with sufficient skilled labor, it is indicated that virtually all current supply of skilled mechanics is now employed. Most plants are now operating at full so far as day time operations are concerned and in some instances a broader night force is desirable but unattainable because sufficient labor is not available. Of course, a large contributing cause to the scarcity of skilled men is attributable to the fact that in the past 10 years, during the depression era, apprentice training was sharply restricted.

Inquiries Have Tapered Some Following Record Volume

CLEVELAND—Domestic inquiries have tapered slightly recently, probably due to the extended delivery situation. Backlogs are sufficient to maintain production for months ahead, during which time orders will accumulate, provided the war continues. Foreign business is still good and delivery prices are much more extended than on the domestic side, due to producers' efforts to accommodate domestic buyers.

Study of domestic bookings from Sept. 5 to Oct. 10 shows that while the orders were induced by the war, they are not predominantly war business. In that period around 55 per cent of the domestic orders were for miscellaneous domestic peace-time production; around 20 per cent for the aircraft industry; 15 per cent for the machine tool industry and 10 per cent for armament. From the standpoint of orders entered on producers' books, September stands out as one of the heaviest months in the history of the industry. From the standpoint of inquiries it is

doubtful if September has ever been exceeded. Activity of the machine tool industry, like the steel industry, is in excess of general industrial activity.

It is significant that one producer reports average domestic distribution as approximately two machines to a customer since Labor Day.

Ford Motor Co. is inquiring for 30 more lathes. The Diesel Engine division of General Motors Corp. here has a backlog of around \$7,000,000 of Government work now.

Dealers report that the price situation on new machines has created some confusion. This is probably due to the fact that stipulations of various producers vary. In a few cases price regulations have resulted in order hold-ups, controversies or transfer of awards to other producers.

Demand for used machinery continues very strong and prices are quite generous. For example, one type of boring mill which has not been produced for over 20 years was sold recently at a price slightly in excess of its original purchase price.

Much Foreign Buying Pending In Detroit Market

DETROIT—Foreign buying hangs in the air, but for the most part orders are not being written up. Bona fide foreign orders have been received in this territory for a number of surface grinding machines, however. One company is said to have been offered an order for 65 machines if delivery were promised across the seas this year. Another order for 500 machines has been dangled before a manufacturer. But in each case the delivery situation and the manufacturer's heavy domestic business prevented any conclusive action. Because of the tangible foreign business, domestic customers are finding machine tool manufacturers insist that customers give them a flat "yes" or "no" so they will know how to arrange production in their shops. Machine tool manufacturers seem earnest in their desire to protect domestic customers before taking on foreign business in large quantities.

Foreign credit problems again arise, with manufacturers generally insisting on cash in their local banks before they begin work on new orders. From almost every quarter machine tool people report waves of foreign inspectors descending on their plants. It is believed that in many cases the visitors are anxious to size up potential capacity as much as to check on current jobs.

Demand for rebuilt equipment is indicated by a Detroit shop which announced it had a few on hand; 50 inquiries followed. A firm which rebuilds automatic screw machines on order for production shops is now buying old, broken down screw machines and lathes and rebuilding them for sale.

The strike at Chrysler has short-circuited many buying orders which were being rushed through. It has been learned that the purchasing department has sent back requisitions to their originators pend-

ing some settlement on the strike. Some of the equipment so delayed was said, before the strike, to be an immediate requirement.

A Navy award in the last week went to Morton Mfg. Co. of Muskegon Heights, Mich., for a \$50,500 draw-cut traveling head shaper.

Machinery in the old Stewart Motor Corp. factory at Buffalo has been purchased by the Universal Trading Corp. of New York, buying agent for the Chinese Government, and is being shipped to China. A plant will be erected at Kunming for a new truck manufacturing factory, it is tentatively announced.

Chicago Dealers Still Booking Many Orders

CHICAGO—Chicago sellers are still entering a goodly number of orders. October already would have exceeded September volume were it not for some business that was diverted elsewhere because of deliveries. Where a buyer could go today, however, and find good deliveries, other than from sellers of used and rebuilt machine tools, is a difficult question to answer. Here in the Middle West where no huge orders from Federal agencies, airplane plants, and the like, have been received, except from the Rock Island Arsenal, some small plants buying machinery find it hard to believe that the congestion in builders' plants is not being misrepresented for sales purposes. One company represented here whose deliveries now are being quoted nine months from today has withdrawn all prices, and will take further orders only on the basis of the price prevailing 60 days before shipment, the maximum increase to be 10 per cent. The determination of machine tool builders not to increase prices until absolutely necessary is worthy of notice.

Machinery Buying Still Going Strong in the East

NEW YORK—Despite the conclusion last week of one of the largest buying programs in the history of this district on the part of one plant, general buying is still keeping the pot boiling. This buying continues to be largely of a military nature, however, including plants making aircraft parts, those having Government contracts of one kind or another, those receiving overflow business in parts from those engaged in such work, and finally and by no means least the arsenals and Navy yards themselves. The arsenals are up to the hilt in the equipment modernization program for which large sums have been voted by Congress.

The problem of deliveries continues to harass both buyer and seller. Some machine tool companies who profited early in the deluge of orders are practically out of the present market and have turned the lead over to their competitors. Delivery promises have jumped from 10 weeks to six months in a matter of a week on some items. One machine quoted for January delivery on a Monday was advanced to June delivery by the time the order was confirmed on Friday. No companies are giving options, even for 24 hours.

There are a number of foreign missions in the city buying anything from single machines to whole plants. Chief interest centers on equipment for the production of aircraft.

Hot Galvanizing

(CONCLUDED FROM PAGE 27)

sheet wares to be sure that excess flux wash has been drained from the work, to avoid explosions in the zinc kettle. For all other work, warm to hot flux washes are preferred to minimize these explosions and to remove adsorbed hydrogen from the pickled and rinsed work. The warmer the flux wash the more quickly the withdrawn work dries and the more quickly the adsorbed hydrogen is removed to assure smoother coatings. Likewise, the warmer the flux wash, the more concentrated it should be to create a sufficiently dense protecting flux film on the work. Additional drying on a hot plate can be used but this operation requires caution to avoid over-drying and thus destroying the film.

Typical flux washes at the following densities and temperatures are in

constant use: 5 to 12 deg. Baumé at 175 deg. F. for straight wire; 10 to 15 deg. Baumé at 140 deg. F. for woven wire fabrics; 12 to 25 deg. Baumé at 175 deg. F. for tanks, drums, etc.; 18 to 25 deg. Baumé at 175 deg. F. for castings; 18 to 29 deg. Baumé at 120 deg. F. for pipe; and 12 to 20 deg. Baumé, cold, for sheet wares. The temperatures given are approximate minima. Higher temperatures are not harmful, merely evaporating the water more rapidly.

In hot flux washes the tendency is for concentrations to increase by evaporation of water, so that it is sufficient to mark the working level in the tank and merely add water to dilute to correct density. When new salts are required, determine the amount of salt needed by finding the deficiency as follows. Subtract the figure for the actual number of pounds per gallon in the flux wash from the correct figure for the density required (see Table II) and multiply this dif-

ference by the volume of flux wash in the tank, thus determining the total quantity of crystals to add.

A point of major importance in the successful use of zinc ammonium chloride flux washes is to keep them free of iron in the solution or as a sludge. Under practical galvanizing shop operating conditions the flux wash will gradually become contaminated by iron. When this contamination amounts to about 0.5 oz. Fe per gal., the flux wash should be discarded or purified. Purification is accomplished by adding hydrogen peroxide (cautiously) to throw the iron out as a sludge. After this sludge settles, decant the clear liquid and save it. Throw away the sludge.

The author acknowledges with thanks the kindness of the Laclede Steel Co., Alton, Ill., for providing samples used in Figs. 2 and 3; and the Triangle Conduit & Cable Co., Elmhurst, L. I., for supplying the sample used in Fig. 4.

TRADE NOTES

Nitrilloy Corp. announces the licensing of the Metallurgical Laboratories, Inc., Philadelphia; Ontario Research Foundation, Toronto, and Pittsburgh Commercial Heat Treating Co., Pittsburgh, to use its patented nitriding process. The company now has 11 agents in the commercial nitriding field.

Columbus Meta's Co., 459 Parsons Avenue, Columbus, Ohio, has taken a 50-year lease on the property adjoining its present plant, according to A. M. Seff, proprietor of the company. The firm is a manufacturer and smelter of solders, pig lead, tin and zinc and scrap metals.

Fred R. Hearn, owner of the Hearn Die Tool & Machine Co., Columbus, was renamed president of the Capital City Products Co. Mr. Hearn succeeded Wade E. Utley, who resigned a few weeks ago to enter a new field.

Gerity-Adrian Mfg. Corp., Adrian, Mich., is erecting a 300 x 100 ft. office building and factory to take care of increased production of steel parts which the company plates and finishes for the automotive, refrigeration, plumbing and allied industries. The building is to be completed the latter part of November. Albert Kahn, Inc., architects and engineers, designed the building.

Austin Co., Cleveland, has been awarded a contract to construct an addition to Sterling Foundry Co.'s Wellington, Ohio, plant. This is the second expansion made by the foundry recently.

R. H. Freitag Co., 1006 Grant Street, Akron, Ohio, is completing plans for an \$11,000 ad-

dition which will be equipped with new machinery for the manufacture of molds and dies for the rubber and plastics industry.

Sinclair-Collins Valve Co., Akron, Ohio, manufacturer of specialized control valves for hydraulic machinery, is spending approximately \$20,000 for a new 41 x 100-ft. factory addition. Additional space was required because of a marked increase in business.

John S. Barnes Corp., Rockford, Ill., has opened a Detroit district sales office at 593 New Center Building in charge of Arnold J. Werner.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y., has made the following appointments on the Pacific Coast: Stone Ryals Electric & Mfg. Co., representative for the San Francisco district, and Preston Faller, representative for the Seattle, Wash., district.

Wheelco Instruments Co., Chicago, has appointed D. A. Campbell, 277 Broadway, New York, as district manager for eastern New York, northern New Jersey and Connecticut.

Louisville Mill Supply Co., 1012 E. Main Street, Louisville, Ky., has been appointed distributor for the T. B. Wood's Sons Co. line of power transmission machinery. M. D. Larkin Co., 115-121 E. Third Street, Dayton, Ohio, has been appointed distributor in the Dayton area. Henry D. Clark, 94 Plane Street, Newark, N. J., has been appointed district representative in northern Jersey and the New York metropolitan area.

National Tube Co. has moved its New Orleans office to 722 Canal Bank Building.

New Wrinkle, Inc., Dayton, Ohio, licensor of "Wrinkle Finish," announces the appointment of Allied Finishing Specialties Co.,

a division of Chicago Bronze & Color Works, 541-45 Larrabee Street, Chicago, as licensee for the manufacture of "Wrinkle Finish."

General Electric Co. has transferred its specialty appliance division from Cleveland to Bridgeport, Conn.

American Marsh Pumps, Inc., of Battle Creek, Mich., has opened sales offices in the Syndicate Trust Building, St. Louis, with E. H. Davis as manager.

Parkersburg Rig & Reel Co. of Parkersburg, W. Va., manufacturer of drilling supplies, has opened a district office in the Missouri Pacific Building, St. Louis, with E. Lloyd Beyer as manager.

Portland Stove Foundry Co., Portland, Me., has purchased patterns of the Wood & Bishop Co., Bangor, Maine, a firm which is going out of business after 100 years.

Burdett Oxygen Co., 3300 Lakeside Avenue, Cleveland, has recently been appointed sole distributor in Ohio for the complete line of the Hampton AC Electric Welders, manufactured by the Hampton Electric Tool Co., 700 Walnut Street, Edgewood, Pittsburgh.

Harbison-Walker Refractories Co., Pittsburgh, for the quarter ending Sept. 30, reports estimated net earnings, including subsidiaries, of \$518,200, after deductions for Federal and states taxes and depreciation and depletion, equivalent to 35c. a share on outstanding common stock. This compares with net earnings of \$154,700 in the corresponding 1938 period. Net earnings for the first nine months of the year were estimated at \$916,900.

Polishing Technique for Stainless Steels

(CONCLUDED FROM PAGE 35)

blocked out with adhesive tape, or paper, and the whole put under the brush for two or three passes. The brush dulls the bright surface and, when the mask is removed, the design is revealed in pleasing contrast. This process is very useful for producing striped effects; alternate stripes of tampico finish and mirror finish being useful for various purposes in decorative work.

The procedure for chemical etching is somewhat similar in that the regions to remain bright are protected by wax, or some other impervious substance, while the unprotected surface is exposed to suitable chemical solutions which will attack it rapidly.

The method of protection of the surface is, however, different in the chemical process. A pattern, or drawing, of the design is first made in black and white on drawing paper. This is then photographed, and a flexible negative of the dimensions of the finished design made on cut film. This is printed on sensitized zinc and etched in the usual way to form the master plate.

This master plate is put in a press, covered with a thin sheet of rubber, and the design printed on the stainless surface with printer's ink. This is dusted with a powder composed of equal parts of rosin, pitch, and asphaltum. This powder, which must be very fine, adheres to the printed part, but not to the polished surface to be etched. The sheet is then baked at a moderate heat sufficient to just fuse the rosin, pitch, and asphaltum powder, and is then ready for the etching solution.

There are several etching solutions that may be used, as follows:

- (a) Saturated solution of ferric chloride (Fe Cl_3) in hydrochloric acid, to which a little nitric acid has been added. This may be used full strength, or diluted for more moderate action. This is a powerful and rapid etching agent.
- (b) An etching solution made up of 100 parts hydrochloric acid, 6.5 parts mercurous nitrate (HgNO_3), and 100 parts of water. This should be heated for solution, but should be used cold. It will produce a light etch.

Other solutions, containing hydrochloric acid or ferric chloride, may be made up, and some experimentation may be desirable in order to de-

velop the best solution for a particular job.

When the surface is sufficiently etched, the acid is washed off, and the gum removed with gasoline or other solvent. As a matter of precaution it is desirable to give a final washing with dilute alkali solution to remove all traces of acid. This is followed by a final rinse in clear water and, if the surface is to be exposed to the weather, passivation with nitric acid should follow.

Chemical etching methods are preferred where enamels are to be used, as they cut deeper and give a sharper edge. Properly compounded solution will etch evenly without pitting, and will not undercut unless the action is allowed to go too far.

Protection of Stainless Surfaces

While the stainless steels have the highest corrosion resistance of any commercial metals, they are not to be considered completely "fool-proof," and reasonable care must be observed if satisfactory service is expected.

The actual cause of the remarkable corrosion resistance of these steels is still a subject for discussion, but is generally believed to be due to the existence of a very thin, continuous, film, supposedly of oxide, that forms naturally on the surface when exposed to free oxygen, as in the air. This film is transparent, and, because impervious and continuous, prevents further attack on the metal. The formation of this film may be hastened, or induced artificially, by strong oxidizing agents, such as nitric acid or alkaline dichromates, which do not attack the metal. The intentional, controlled, formation of this protective film is known as "passivation."

The usual procedure is, after all grease or other surface dirt has been removed, to immerse the stainless steel article in a 10 to 20 per cent solution by volume of nitric acid (commercial sp. g. 1.42) at 120 to 130 deg. F. for about 20 to 30 min. If by nature of the size, shape, or location of the article or surface to be passivated, immersion is impractical, effective results may be obtained by swabbing with the nitric acid solution, either hot or cold. It should be noted, however, that the hot solution is far more effective and

is to be preferred. In either case, whether the stainless surface is immersed, or swabbed, the treatment should be followed by thorough rinsing with clean water. Other solutions may be used, such as 5 per cent potassium or sodium dichromate, used boiling hot. But the nitric acid solution is recommended as being the more convenient and effective.

It is important that all grease, surface dirt, or other substances that might interfere with the action of the passivating agent, be completely removed before passivation treatment is attempted.

When final polishing or buffing is done with compounds containing green chromic oxide, passivation is considered unnecessary as the green chromic oxide appears to induce the formation of a passive film.

Passivation is recommended for all surfaces or articles that will be exposed to weather conditions. It serves a dual purpose. It puts the surface in best condition to resist corrosive attack through formation of the protective oxide film, and it also removes any foreign metal or other substance resulting from shearing, machining, forming, or other fabricating operation, that might contaminate the surface and cause the beginning of corrosive attack.

Properly polished, or passivated, surfaces of 18-8 and higher stainless steels will remain untarnished, even when exposed to salt air. However, surfaces must be kept clean and free from accumulations of soot, dirt, or particles of other metals. To keep stainless steel surfaces clean, ordinary soap and water is used and the metal is dried with a clean cloth. If any abrasive should be necessary to remove scum, or caked deposits, Bon Ami is very satisfactory. Under no circumstances should liquid or other metal "polishes" or "cleaners" be used. They are entirely unnecessary and may actually do harm. In no case should ordinary steel wool be used as it will leave a film of iron that will discolor and may even cause rusting. The use of stainless steel wool is, of course, unobjectionable.

Finger marks and smears on polished surfaces can easily be removed by rubbing with a clean cloth and a little whiting or prepared chalk. If badly smeared, gasoline or carbon tetrachloride may be used, to be followed by the whiting.

PRODUCTS INDEX

CHECKS—Metal
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

CHEMICALS—Industrial
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CHEMICALS—Rust Proofing
Alrose Chemical Co., Cranston, Providence, R. I.
Parker Rust Proof Co., 2188 Milwaukee Ave., Detroit.

CHROMIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

CHRONOGRAPHS
Stillman, M. J., Co., Inc. Chicago.

CHUCKING MACHINES—Automatic
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.

CHUCKING MACHINES—Multiple Spindle
Baird Mch. Co., The, Bridgeport, Conn.
Goss & DeLeeuw Machine Co., New Britain, Conn.
National Acme Co., The, Cleveland.
Potter & Johnston Machine Co., Pawtucket, R. I.

CHUCKS—Drill
Cleveland (Ohio) Twist Drill Co., The, Bedford, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

CHUCKS—Magnetic
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., Worcester, Mass.
Taft-Pelree Mfg. Co., The, Woonsocket, R. I.

CLAMPS—Cable Strain
Emmeleny Electric & Mfg. Co., East Palestine, Ohio.

CLAMPS—Rail Booster
Emmeleny Electric & Mfg. Co., East Palestine, Ohio.

CLAY GUNS
Bailey, Wm. M. Co., Pittsburgh.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Ford, J. B., Sales Co., The, Wyandotte, Mich.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CLEANING COMPOUNDS—Alkali
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CLEANING EQUIPMENT (METAL)—Electric-Chemical
Bullard Co., The, Bridgeport, Conn.

CLUTCH-BRAKES—Magnetic
Kiekhafer Corp., Cedarburg, Wisc.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

CLUTCHES
Falls Clutch & Mchry. Co., The, Cuyahoga Falls, Ohio.
Foote Bros. Gear & Machine Co., 5301-H So. Western Blvd., Chicago, Ill.
Medart Co., The, St. Louis, Mo.
Morse Chain Co., Ithaca, N. Y.

CLUTCHES—Friction
Dodge Mfg. Corp., Mishawaka, Ind.
Twin Disc Clutch Co., Racine, Wisc.

CLUTCHES—Magnetic
Cutter-Hammer, Inc., Milwaukee.
Dings Magnetic Separator Co., 727 Smith St., Milwaukee.
Kiekhafer Corp., Cedarburg, Wisc.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

COAL
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Koppers Coal Co., The, Pittsburgh.
Plekands Mather & Co., Cleveland.
Soyuzkugmorsk, Kallaevskaja Ulitsa 5, Moscow 6, U. S. S. R.

COAL ORE & ASH HANDLING MACHINERY
Herl & Patterson, Inc., Pittsburgh.
Link-Belt Co., 300 West Pershing Road, Chicago, Ill.

COBALT METAL
Central Trading Corp., 511 Fifth Ave., N. Y. C.

COILS—Lead
National Lead Co., 111 Bdw., N. Y. C.

COILS—Pipe
Harrisburg (Pa.) Steel Corp.

COKE—Metallurgical
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Plekands Mather & Co., Cleveland.

COKE OVEN MACHINERY
Atlas Car & Mfg. Co., The, Cleveland
Koppers Co., Engineering & Construction Div., Pittsburgh.

COLD ROLL FORMING MACHINES
McKay Machine Co., The, Youngstown, Ohio.

COLLETS
Rivet Lathe & Grinder, Inc., Boston, Mass.

COLUMBIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

COMBUSTION CONTROLS
Brown Instrument Co., The, Philadelphia.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

COMPOUNDS—Drawing
Morgan Construction Co., Worcester, Mass.
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh.

Standard Oil Co. (Indiana), Chicago.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

COMPRESSORS—Air
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Spencer Turbine Co., Hartford, Conn.
Worthington Air Brake Co., Industrial Div., Pittsburgh.
Worthington Pump & Machinery Corp., Harrison, N. J.

COMPRESSORS—Gas
Worthington Pump & Machinery Corp., Harrison, N. J.

COMPRESSORS—Rebuilt. (See Clearing House Section)

CONDENSERS—Surface & Jet
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONDUITS—Flexible Metallic
Pennsylvania Flexible Metallic Tubing Co., Philadelphia.

CONTACTS—Electrical
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

CONTRACTORS' SUPPLIES — Second-Hand. (See Clearing House Section)

CONTROL SYSTEMS—Temperature
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

CONTROLLERS—Crane
Clark Controller Co., The, Cleveland.
Cutter-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.

CONTROLLERS—Electric
Clark Controller Co., The, Cleveland.
Cutter-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.
General Electric Co., Schenectady, N. Y.

CONTROLLERS—Valve, Electrically Operated
Brown Instrument Co., The, Philadelphia.
Cutter-Hammer, Inc., Milwaukee.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

CONTROLS—Time Cycle
Koppers Co., Bartlett Hayward Div., Baltimore, Md.

CONVEYING AND ELEVATING MACHINERY
Farquhar, A. B., Co., Ltd., York, Pa.
Heyl & Patterson, Inc., Pittsburgh.
Link-Belt Co., 300 West Pershing Road, Chicago, Ill.

CONVEYOR WORMS
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.

CONVEYORS—Monorail
American Monorail Co., The, Cleveland.
Cleveland Tramway Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

CONVEYORS—Portable
Farquhar, A. B., Co., Ltd., York, Pa.

COPING MACHINES
Cleveland (Ohio) Punch & Shear Works Co., The.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

CORE OIL
Penola, Inc., Pittsburgh.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

CORUNDUM WHEELS—See Grinding Wheels

COTTERS AND KEYS—Spring
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 749 Central Ave., Pontiac, Mich.
Western Wire Prods. Co., St. Louis, Mo.

COUNTERPORES
Carboloy Co., Inc., 11155 East 8-Mile Road, Detroit, Michigan.
Cleveland (Ohio) Twist Drill Co., The.
Gairing Tool Co., Detroit.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

COUNTERS—Production
Streeter-Ames Co., Chicago.
Veeder-Root, Inc., Hartford, Ct.

COUNTING MACHINES
Veeder-Root, Inc., Hartford, Conn.

COUPLINGS—Cut-Off Friction
Foote Bros. Gear & Machine Co., 5301-H So. Western Blvd., Chicago, Ill.

COUPLINGS—Flexible
Crocker-Wheeler Electric Mfg. Co., Amherst, N. Y.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Morse Chain Co., Ithaca, N. Y.
Penola Foundry & Mch. Co., Baltimore, Md.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS—Pine
Champion Machine & Forging Co., The, Cleveland, Ohio.
Harrisburg (Pa.) Steel Corp.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

CRANES—Crawling Tractor
American Holt & Derrick Co., St. Paul, Minn.
Cullen-Friestedt Co., 1303 S. Kilbourn Ave., Chicago.

JUST BETWEEN US TWO

Blurb

Bloomers and your favorite family journal, we were delighted to discover recently, were both born in the same year, 1855. The former, as you know, were the invention of Amelia Bloomer and the latter of John Williams.

Bloomers are now but a memory, preserved only by Gene Sarazen. They lacked the ability to conform to changed conditions. Your favorite family journal, on the other hand, learned early the secret of eternal youth, and, in its 84th year, is leading the publishing parade.

Last month more new members joined the one big, more or less happy family of Iron Age readers than in any other September since Lord knows how long.

High-Priced Hauteur

"Whitey" Maurath wonders whether it was worth going to the trouble to equip the Worth girl (page 7, Oct. 5 issue) with \$25,000 worth of jewelry, when Woolworth reproductions would have given the same photographic effect.

However, it might be that the knowledge that she was wearing a small fortune unconsciously gave the model that upper Fifth Avenue look the photographer wanted, the same as when you wear your \$1.50 necktie.

Anyway, she has something, as another advertiser called up and asked how he could get in touch with the photographer.

Unlimned Limbs

In the illustration, as you probably don't recall, the skirt touched the ground, making us think what an inept illustration it would be for an ad of our subscriber, the Underpinning & Foundation Co., New York City.

Goodwill Talks and Sandwiches

One of our field men reports calling on a plant in which, he says, "the employees are soothed during lunch hour by a public address system." The verb is his.

As one who has been driven from restaurants by obtrusive radios, we commiserate with the workers whose digestive organs are not permitted to function in peace, and offer this as something else for the N.L.R.B. to disagree on.

Six Gracious Words

This phrase in a letter from Tanisaka Ranar, a Japanese reader, strikes us pleasantly:

"Please treat us kindly as usual."

Minus M, Plus B

"... larger appropriations are being made ... in the face of an unprecedented national debt of \$40,000,000."

—*"This Week in Washington"*

Just peanuts, Moff. The \$263,166,398 Poland owes us from the last war will clean the slate four times over.

Trade Paper Threat

One of our commercial travelers called on a non-subscribing tool manufacturer with reform in his heart. He was told, "I read no trade papers. The Bible is enough for me."

Which is all right by us, but if it becomes a trend we will call on the Associated Business Papers, Inc., to Take Steps.

Jones Gyps on Time Slip

Sharp-eyed Marvin Cook of Houston, Tex., who is catching up with his reading after reducing the Gunnison River's piscatorial population, finds an error in adding up the 1899 time slip in the Aug. 10 chapter of the series on mechanization's effect on employing power. The total given is 56.8 hours. It should be 56.4.

That's 4/10ths of an hour at say 20c an hour. Harry Johnson, the artist who drew the time slip, has been directed to step into Buck Rogers' time machine, and dock John Jones, Sr., 8c on his next payroll envelope.

Puzzles

Last week's quotation, which caused Philetus to fall on his grammar and end it all, is on display in Ripley's Odditorium, nine blocks north of here. Ripley doesn't give the answer, but it seems to us there are several, and all of them right.

If you remember the formula for this one, par is five minutes. Otherwise you can take all morning:

A man is given \$100 with which to stock a farm. He must buy an assortment of 100 head of cows at \$10, pigs at \$3, and chickens at 50¢. How many of each does he buy?

—A. H. D.

PRODUCTS INDEX

Harnischfeger Corp., 4101 W. National Ave., Milwaukee.
 Industrial Brownhoist Corp., Bay City, Mich.
 Ohio Locomotive Crane Co., The, Bucyrus, Ohio.
CRANES—Electric, Industrial, Truck Mounted
 Baker-Hauling Co., The, 2175 W. 25th St., Cleveland.
 Elwell-Parker Electric Co., The, Cleveland.
CRANES—Electric Traveling
 Arnel, James P., Pittsburgh.
 Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
 Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
 Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
 Euclid Crane & Hoist Co., The, Euclid, O.
 Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
 Morgan Engineering Co., The, Alliance, O.
 Northern Engineering Works, Detroit, Mich.
 Robbins & Myers, Inc., Springfield, Ohio.
 Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
 Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
 Whiting Corp., Harvey, Ill.
CRANES—Gantry
 Dravo Corp., Engineering Wks. Div., Pittsburgh.
 Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
 Morgan Engineering Co., The, Alliance, O.
 Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
 Whiting Corp., Harvey, Ill.
CRANES—Hand Power
 American Monorail Co., The, Cleveland.
 Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
 Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
 Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
 Euclid Crane & Hoist Co., The, Euclid, O.
 Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
 Industrial Brownhoist Corp., Bay City, Mich.
 Northern Engineering Works, Detroit.
 Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
 Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
 Whiting Corp., Harvey, Ill.
CRANES—Jib
 American Monorail Co., The, Cleveland.
 Euclid Crane & Hoist Co., The, Euclid, O.
 Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
 Whiting Corp., Harvey, Ill.
CRANES—Locomotive
 American Hoist & Derrick Co., St. Paul, Minn.
 Cullen-Friedstedt Co., 1303 S. Kilbourn Ave., Chicago.
 Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
 Industrial Brownhoist Corp., Bay City, Mich.
 Link-Belt Co., 300 West Pershing Road, Chicago, Ill.
 Ohio Locomotive Crane Co., The, Bucyrus, O.
CRANES—Monorail
 American Monorail Co., The, Cleveland.
 Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
 Euclid Crane & Hoist Co., The, Euclid, O.
 Northern Engineering Works, Detroit.
 Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
 Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
CRANES—Portable
 Canton Fdry. & Mch. Co., Cleveland.
CRANES—Portable Electric
 Baker-Hauling Co., The, 2175 W. 25th St., Cleveland.
 Elwell-Parker Electric Co., The, Cleveland.
CRANKSHAFTS
 Transue & Williams Steel Forging Corp., Alliance, Ohio.
 Union Driven Steel Div. Republic Steel Corp., Massillon, Ohio.
CRANKSHAFTS—Forged
 Bay City Forge Co., Erie, Pa.
 Krons Forge Co., Chicago, Ill.
 Midvale Co., The, Nicetown, Phila., Pa.
CRUSHERS—Coal
 American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.
CRUSHERS—Steel Turning
 American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.
CUPOLA CHARGING EQUIPMENT
 Lake Erie Engineering Corp., 68 Kenmore St., Buffalo, N. Y.
CUTTERS—Die Sinking
 Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
 Tomkins-Johnson Co., The, Jackson, Mich.
CUTTERS—Keyseating
 Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.
CUTTERS—Milling
 Barber-Colman Co., Rockford, Ill.
 Brown & Sharpe Mfg. Co., Providence, R. I.

Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
 Cleveland (Ohio) Twist Drill Co., The, Morse Twist Drill & Mch. Co., New Bedford, Mass.
 Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
 Victor Machinery Exchange, 251 Centre St., N. Y. C.
CUTTING-OFF MACHINES—Abrasives
 Tabor Mfg. Co., Phila.
CUTTING-OFF MACHINES—Cold Saw
 Espen-Lucas Mch. Wks., Philadelphia.
CUTTING-OFF MACHINES—Pipe or Tubing
 Aetna-Standard Engineering Co., The, Youngstown, Ohio.
 Bardons & Oliver, Inc., Cleveland.
 Landis Mch. Co., Inc., Waynesboro, Pa.
CUTTING AND WELDING APPARATUS
 —Oxy-Acetylene—See Welding and Cutting Machines and Equipment—Oxy-Acetylene.
CYLINDERS—Compressed Air & Hydraulic
 Hannifin Mfg. Co., Chicago.
 Tomkins-Johnson Co., The, Jackson, Mich.
CYLINDERS—Seamless
 Harrisburg (Pa.) Steel Corp.
 Midvale Co., The, Nicetown, Phila., Pa.
 National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
DEGREASING COMPOUNDS
 Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
DEOXIDIZERS
 Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.
DESIGNING & DEVELOPING
 Torrington (Conn.) Mfg. Co., The.
DIAMOND TOOLS
 Bausch & Lomb Optical Co., Rochester, N. Y.
DICTATING MACHINES
 Dictaphone Corp., 420 Lexington Ave., N. Y. C.
DIE BLOCKS—Drop Hammer
 Heppenstall Co., Pittsburgh.
 Krons Forge Co., Chicago, Ill.
DIE CASTING MACHINES
 Reed-Prentice Corp., Worcester, Mass.
DIE SINKING MACHINES—Automatic and Hand
 Cincinnati (Ohio) Milling Mch. Co., The, Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
DIEING MACHINES—Automatic
 Henry & Wright Mfg. Co., Inc., Hartford, Conn.
DIES, JIGS, FIXTURES, etc.
 Barth Stamping & Mch. Wks., Cleveland.
 Boyar-Schultz Corp., 2106 West Walnut St., Chicago, Ill.
 Star Machine & Tool Co., Cleveland, Ohio.
 Taft-Peirce Mfg. Co., The, Woonsocket, R. I.
DIES—Cast Tool Steel
 Advance Foundry Co., The, Dayton, Ohio.
 Detroit (Mich.) Alloy Steel Co.
 Forging & Casting Corp., The, Ferndale, Mich.
DIES—Drawing & Sizing
 Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
DIES—Pipe Threading
 Acme Machinery Co., The, Cleveland.
 Landis Mch. Co., Inc., Waynesboro, Pa.
 National Acme Co., The, Cleveland.
DIES—Resistance Welding
 Mallory, P. R., & Co., Inc., Indianapolis, Ind.
DIES—Screw and Thread Cutting
 Acme Machinery Co., The, Cleveland.
 Eastern Mach. Screw Corp., New Haven, Ct.
 Geometric Tool Co., The, New Haven, Conn.
 Greenfield (Mass.) Tap & Die Corp.
 Jones & Lamson Mch. Co., Springfield, Vt.
 Landis Mch. Co., Inc., Waynesboro, Pa.
 National Acme Co., The, Cleveland.
DIES—Self-Opening Adjustable
 Acme Machinery Co., The, Cleveland.
 Eastern Mach. Screw Corp., New Haven, Ct.
 Geometric Tool Co., The, New Haven, Conn.
 Jones & Lamson Mch. Co., Springfield, Vt.
 Landis Mch. Co., Inc., Waynesboro, Pa.
 Murche Machine & Tool Co., Detroit, Mich.
 National Acme Co., The, Cleveland.
DIES—Sheet Metal Working
 Cimacool Co., The, Dayton, Ohio.
 Worcester (Mass.) Stamped Metal Co., 6 Hunt St.
DIES—Steel Letters and Stamps
 Noble & Westbrook Mfg. Co., The, East Hartford, Ct.
DOORS & SHUTTERS, Fireproof
 Kinnear Mfg. Co., Columbus, Ohio.
DOORS & SHUTTERS—Steel or Wood
 Rolling Kinnear Mfg. Co., Columbus, Ohio.
DRAW BENCHES
 McKay Machine Co., The, Youngstown, Ohio.
DRAWN WORK—Metal—See Stampings or Drawings—Metal
DRILL HEADS—Hydraulic
 National Automatic Tool Co., Richmond, Ind.

DRILL HEADS—Multiple
 Baker Bros., Inc., Toledo, Ohio.
DRILLING MACHINES—Bench
 Leland-Gifford Co., Worcester, Mass.
DRILLING MACHINES—Heavy Duty
 Baker Bros., Inc., Toledo, Ohio.
 Barnes Drill Co., 815-831 Chestnut St., Rockford, Ill.
DRILLING MACHINES—Multiple Spindle
 Baker Bros., Inc., Toledo, Ohio.
 Barnes Drill Co., 815-831 Chestnut St., Rockford, Ill.
 Greenlee Bros. & Co., Rockford, Ill.
 Henry & Wright Mfg. Co., The, Hartford, Conn.
 National Automatic Tool Co., Richmond, Ind.
DRILLING MACHINES—Multiple Spindle Adjustable
 National Automatic Tool Co., Richmond, Ind.
DRILLING MACHINES—Multiple Spindle Horizontal
 Baker Bros., Inc., Toledo, Ohio.
 Greenlee Bros. & Co., Rockford, Ill.
 National Automatic Tool Co., Richmond, Ind.
DRILLING MACHINES—Portable Electric
 Millers Falls Co., Greenfield, Mass.
DRILLING MACHINES—Portable Pneumatic
 Helwig Mfg. Co., St. Paul, Minn.
 Warner & Swasey Co., The, Cleveland.
DRILLING MACHINES—Radial
 Bryant Machinery & Engineering Co., Chicago.
 Cincinnati (Ohio) Bickford Tool Co., The, Cleveland (Ohio) Punch & Shear Works Co., The.
DRILLING MACHINES—Sensitive
 Buffalo (N. Y.) Forge Co., 492 Broadway, Leland-Gifford Co., Worcester, Mass.
DRILLING MACHINES—Upright
 Baker Bros., Inc., Toledo, Ohio.
 Barnes Drill Co., 815-831 Chestnut St., Rockford, Ill.
 Bryant Machinery & Engineering Co., Chicago.
 Cincinnati (Ohio) Bickford Tool Co., The, Cleereham Mch. Tool Co., Green Bay, Wis.
DRIVES—Gear
 Farrell-Birmingham Co., Inc., Buffalo, N. Y.
 Mesta Mch. Co., Pittsburgh.
DRIVES—Single & Multiple V-Belts
 Allis-Chalmers Mfg. Co., Milwaukee.
DROP FORGINGS—See Forgings—Drop Iron or Steel
DUST COLLECTORS
 Abrasive Machine Tool Co., East Providence, R. I.
 American Blower Corp., 6000 Russell St., Detroit.
 American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
 Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh.
 Pangborn Corporation, Hagerstown, Md.
 Whiting Corp., Harvey, Ill.
ECONOMIZERS
 Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.
ELECTRIC LIGHTING—Industrial
 General Electric Co., Cleveland.
 General Electric Vapor Lamp Co., Hoboken, N. J.
 Westinghouse Electric & Mfg. Co., Lighting Div., Cleveland, Ohio.
ELECTRIC WELDING—See Welding—Electric
ELECTRICAL EQUIPMENT
 Allis-Chalmers Mfg. Co., Milwaukee.
ELECTRICAL MACHINERY—Second Hand. (See Clearing House Section)
ELECTRICAL WIRES
 Roebbing's, John A., Sons Co., Trenton, N. J.
ELECTRODE HOLDERS—Welding
 Lincoln Electric Co., The, Cleveland.
ELECTRODES—Resistance Welding
 Mallory, P. R., & Co., Inc., Indianapolis, Ind.
ELECTRODES—Welding, Coated
 Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
 Lincoln Electric Co., The, Cleveland.
 Maurath, Inc., 7400 Union Ave., Cleveland.
 Metal & Thermit Corp., 120 Broadway, N. Y. C.
ELECTROPLATING EQUIPMENT & SUPPLIES
 Columbia Electric Mfg. Co., 4523 Hamilton Ave., Cleveland, Ohio.
 United Chromium, Incorporated, 51 East 42nd St., N. Y. C.
ELEVATING & HANDLING DEVICES—Hydraulic
 Lyon Iron Works, Greene, N. Y.
ELEVATORS—Material Handling
 Link-Belt Co., 300 West Pershing Road, Chicago.
EMERY WHEELS—See Grinding Wheels

ENGINEERS—Consulting and Industrial
 Koppers Co., Engineering & Construction Div., Pittsburgh.
 Lindemuth, Lewis B., 134 East 47th St., N. Y. C.
ENGINEERS—Metallurgical
 Gathmann Engineering Co., The, Baltimore, Md.
ENGINES—Diesel
 Diesel Engine Div. General Motors Sales Corp., Cleveland.
 Worthington Pump & Machinery Corp., Harrison, N. J.
ENGINES—Gas
 Worthington Pump & Machinery Corp., Harrison, N. J.
ENGINES—Oil
 Worthington Pump & Machinery Corp., Harrison, N. J.
EYELET MACHINES
 Waterbury (Conn.) Farrel Foundry & Machine Co., The.
FACERS—Spot
 Gairling Tool Co., Detroit.
FACING CLAY
 Carborundum Co., The, Perth Amboy, N. J.
FACTORY & PLANT SITES
 Zoll, Edward H., 196 Market St., Newark, N. J.
FANS—Ventilating
 American Blower Corp., 6000 Russell St., Detroit.
 Buffalo (N. Y.) Forge Co., 492 Broadway.
FEED WATER HEATERS AND PURIFIERS
 Harrisburg (Pa.) Steel Corp.
FEEDS—Hydraulic, for Machines
 American Engineering Co., Philadelphia.
 Oilgear Co., The, 1311 W. Bruce St., Milwaukee.
FELT—Wool Mechanical
 American Felt Co., 315 Fourth Ave., N. Y. C.
FENCING—Wire
 Pittsburgh (Pa.) Steel Co.
FERRALLOYS
 Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
 Metal & Thermit Corp., 120 Broadway, N. Y. C.
 Ohio Ferro-Alloys Corp., Canton, Ohio.
 Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.
FERROCHROME
 Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
 Ohio Ferro-Alloys Corp., Canton, Ohio.
 Samuel, Frank & Co., Inc., Philadelphia.
 Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.
FERROMANGANESE
 Bethlehem (Pa.) Steel Co.
 Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
 Jones & Laughlin Steel Corp., Pittsburgh.
 Ohio Ferro-Alloys Corp., Canton, Ohio.
 Samuel, Frank & Co., Inc., Philadelphia.
FERROSILICON MANGANESE
 Ohio Ferro-Alloys Corp., Canton, Ohio.
 Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.
FERROSILICON
 Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
 Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
 Ohio Ferro-Alloys Corp., Canton, Ohio.
 Samuel, Frank & Co., Inc., Philadelphia.
 Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.
FERROSILICON ALUMINUM
 Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.
FERROSPILGELISEN
 New Jersey Zinc Co., The, 160 Front St., N. Y. C.
FERROTITANIUM
 Metal & Thermit Corp., 120 Broadway, N. Y. C.
 Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.
FERROVANADIUM
 Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
 Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.
FIBRE—Sheets, Tubes, Rods, Fabricated Parts
 Continental-Diamond Fibre Co., Newark, Delaware.
FILES & RASPS
 Atkins, E. C. & Co., Indianapolis, Ind.
 Diston, Henry, & Sons, Inc., Philadelphia.
 Nicholson File Co., Providence, R. I.
FILING MACHINES
 Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.
FILTER CLOTH—Asbestos
 Johns-Manville Corp., 22 East 40th St., New York City.
FILTERS—Air
 Whiting Corp., Harvey, Ill.
FILTERS—Oil
 Cuno Engineering Corp., Meriden, Conn.
 National Acme Co., The, Cleveland.
FIRE BRICK—Insulating
 Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.
FIRE CLAY
 Carborundum Co., The, Perth Amboy, N. J.
 Ill.-ols Clay Products Co., Joliet, Ill.
FITTINGS—Brass, Pine and Tube
 Commonwealth Brass Corp., Detroit.